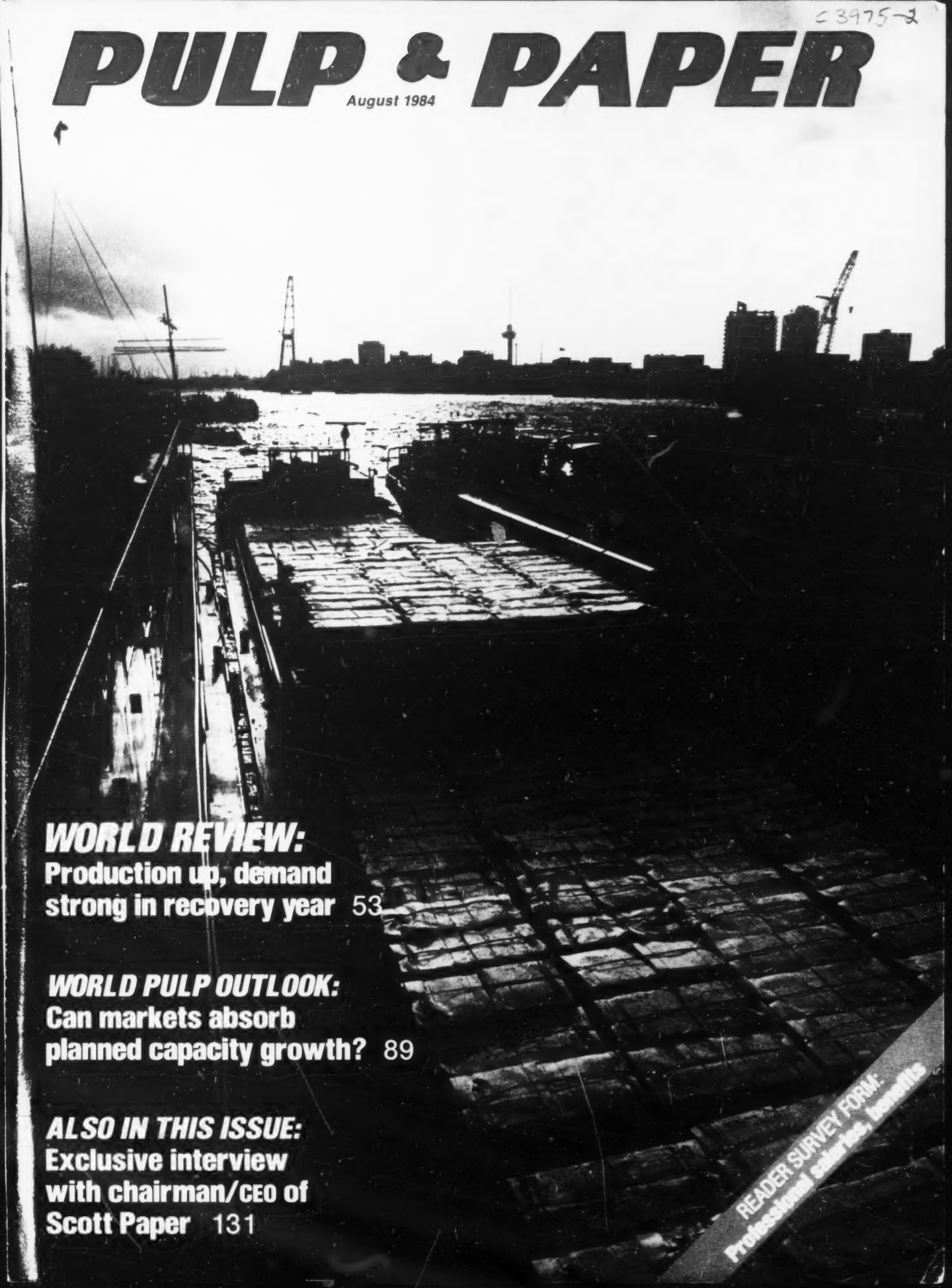
C3975-2

PULP & PAPER

August 1984



WORLD REVIEW:
Production up, demand strong in recovery year 53

WORLD PULP OUTLOOK:
Can markets absorb planned capacity growth? 89

ALSO IN THIS ISSUE:
Exclusive interview with chairman/CEO of Scott Paper 131

READER SURVEY FORM:
Professional salaries, benefits

PULP&PAPER

Volume 58 Number 8

August 1984

WORLD REVIEW 53

ISSUE FOCUS: WORLD REVIEW

53 **World pulp and paper industry review:** U.S. industry leads the way to recovery in 1983-84 as production levels set new records; only a newsprint glut and the strong U.S. dollar cloud forecasts

89 **World market pulp outlook** depends on economic conditions, ability to absorb new capacity coming online this decade; U.S. markets currently strong, but Europe, Japan continue to be slow

106 **World TiO_2 supply seen tightening** as economic, environmental restrictions discourage large capital investments in the industry

109 **Modernization of Chinese paper industry** is continuing at rapid pace, according to report from Rust International tour group; China plans to import technology, boost productivity, increase capacity

113 ***P&P* viewpoint:** three Swedish industry leaders give their views on economic recovery, kronor devaluation, pulp/paper growth prospects

124 **St. Regis's international operations** world's largest, with 30 manufacturing/converting plants in 12 countries, four continents

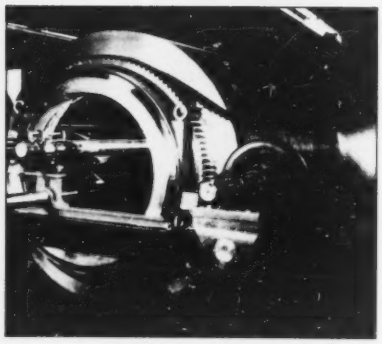
128 **Exclusive *P&P* interview:** SCA's Bo Rydin discusses his company's expansion plans, devaluation, and the health of the Swedish industry

Mill operations

71 **Accumulation of explosive and poisonous gases** from oxidative extraction bleaching stages is a little known, but very real safety hazard

74 **A world's first:** Boise Cascade Canada mill drives complete high-speed dryer section with dryer felt rolls, eliminating gear breakage and reducing machine room noise

126 **Dandy roll use is regaining popularity** as new designs hit the market; better sheet composition, improved formation are possible



DANDY ROLL RESURGENCE 126

COVER: *In Rotterdam, barge loaded with Canadian market pulp destined for European mills reflects the international marketing network of today's pulp and paper industry. (Photo courtesy of British Columbia Forest Products Ltd.)*

Process Automation

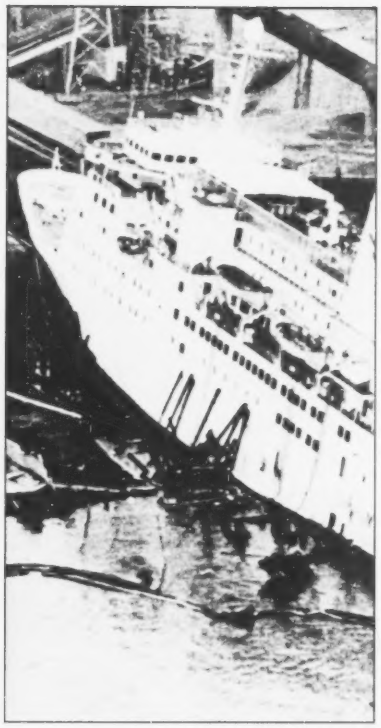
93 **Millwide control system** at Norske Skog's Skogn, Norway, newsprint mill has improved efficiency, quality, and profitability; system includes online pulp quality monitoring, cross-machine caliper control

Management

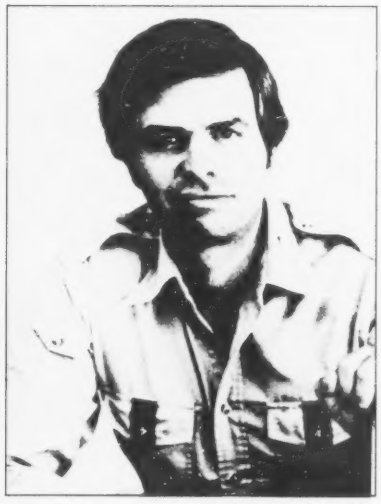
76 **Salary/reader opinion survey:** this issue contains a postage-paid, tear-out survey form; readers can tell us if their salaries and job benefits are keeping pace with the industry recovery

131 **Exclusive *P&P* interview:** Scott Paper Co.'s chairman and CEO Philip E. Lippincott discusses cost-control measures and marketing programs he has overseen at this $2.5-billion-a-year company

Table of contents continues on page 5



DOCKING DISASTER **33**



RATHJE COMMENTS **202**

News

9 **Month in Statistics**—U.S. paper and paperboard production

11 **Marketing Roundup**—Liner producers post Aug. 1 increase; MacMillan Bloedel raises news price by $535; offset hike falls apart

13 **Grade Profile**—Bleached paperboard: limited capacity to tighten market

23 **News Roundup**—**Acquisitions/Mergers:** Merger marketplace is lively

25 Glatfelter to sell Ohio mill to Appleton; no word out on Corner Brook buyer; Louisiana-Pacific ends talks to sell unit to employees

27 **Labor:** Contract signed in B.C.; CPU hopes to wrap up eastern talks

29 **Capacity:** Groundwood papers to lead expansion

31 **Recycled Paperboard:** Boxboard mill buyers busy in June

33 **International Trade:** No change in EEC newsprint quota yet

37 **International News:** Paper machine planned at Scottish mill; Bowater restarts rebuilt machine; Dutch mill to rebuild board machine

39 **Regulatory Roundup:** Supreme Court sides with EPA; House passes clean water bill; rail rates may go up, says ICC

Columns

7 **Editors' Notebook**—World review; reader salary/benefits survey

41 **Washington Viewpoint**—We need moderation in environmental politics

43 **Labor/Management**—The next round—part two

145 **Career Development**—We've got a problem, boss. . . .

157 **Engineer to Engineer**—Engineers, the unpromotable professionals?

187 **Chemical Markets**—Sodium sulfate markets recovering slightly in 1984

202 **Industry Comment**—Packaging reduces solid waste

Departments

45 **Conference Calendar**

149 **News of People**

163 **Product Showcase**

165 **New Products**

175 **Product Review**

177 **Current Literature**

183 **Book Shelf**

184 **Finishing/Converting**

188 **Supplier News**

Services

161 **Reader Service Index**

185 **Reader Service Card**

190 **Professional Service Directory**

192 **Jobs Wanted**

193 **Classified Advertising**

200 **Advertisers Index**

PULP & PAPER (ISSN 0033-4081) is published monthly except November when semi-monthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco, CA, and at additional mailing office. POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

© Copyright 1984 by Miller Freeman Publications Inc.
All rights reserved.

ABP BPA

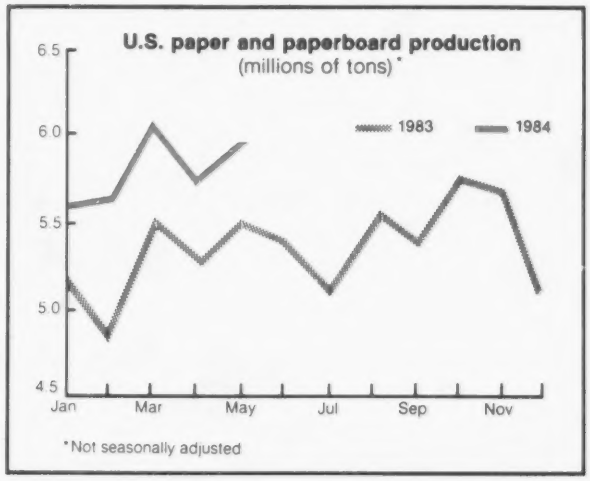
Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $40.00 a year in the U.S. All subscriptions to other countries: $60.00 a year, except Europe and Mediterranean, $70.00 (air service included). Single copy, $4.00, except Buyers Guide, $22.50. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

Requests, subscription orders, and address changes must show name and position or job of individual, name and location of mill, plant or office where employed, and exact business or product produced at this location. **Send subscription correspondence to:** Circulation Department, PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105. For address change, include label from recent issue.

U.S. paper and paperboard production continued at the 68-million-tpy rate in May 1984 and, according to the available weekly data, in June as well, reports the American Paper Institute. Total paper production in the first half of 1984, at an estimated seasonally adjusted rate of 34.3 million tpy, was about 7.5% above the total for 1983. The estimated seasonally adjusted rate of paperboard production for the first half was 34.0 million tons, about 9% above the comparable 1983 rate but 5.5% above the average for all of 1983.

Among major grades, printing papers and other packaging and industrial papers continued to show the largest gains. Newsprint has picked up strongly—the January-May 1984 period was nearly 9% over the same 1983 period. Containerboard production for domestic use in the five-month period was 12% above the 1983 level. Setup boxboard continued its unusually strong performance, showing an 18% gain.

Canadian newsprint shipments were up a strong 24.5% in May compared with the same month in 1983 and rose 8.9% for the January-May period compared with the 1983 period. Operating rates in May were 99% vs 85% in May a year ago.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	May	481	9.3	5,604	8.6
Uncoated groundwood (s)	May	134	0.8	1,608	9.4
Coated paper (s)	May	532	15.2	6,223	16.5
Uncoated free sheet (s)	May	773	5.5	9,313	7.2
Unbleached kraft packaging and industrial (s)	May	330	8.6	3,984	7.2
Tissue	May	412	1.7	4,884	2.7
Total paper	**May**	**2,959**	**7.4**	**35,130**	**8.8**
Kraft linerboard, unbleached	May	1,429	8.4	16,186	9.2
Semichemical medium	May	435	4.8	5,169	12.0
Bleached paperboard	May	350	2.3	4,119	4.2
Recycled paperboard	May	693	12.3	8,244	13.4
Total paperboard	**May**	**3,019**	**8.3**	**34,896**	**10.1**
Total paper and paperboard[5]	**May**	**5,979**	**7.9**	**70,026**	**9.4**
PULP, WASTEPAPER & FIBER[1]					
Total woodpulp production	April	4,722	10.3	55,897	8.6
Market pulp production	April	593	10.4	6,862	9.5
Wastepaper consumption at paper/board mills	April	1,325	13.8	15,847	11.1
Pulpwood consumption (cords)	April	7,344	2.5	88,452	4.2
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	May	23.001	11.0	112,664[6]	10.7
Containerboard inventories at box plants	May	2,512	2.6		
INTERNATIONAL TRADE[1]					
U.S. paper imports (including products)	April	833	19.2	10,295	25.8
Imports of Canadian newsprint	April	560	6.3	7,211[6]	13.8
U.S. paper exports (including products)	April	353	−9.9	4,282	−2.9
Exports of unbleached kraft linerboard	May	187	−7.9	2,073	−10.9
Exports of woodpulp	April	249	−28.3	3,599	1.4
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	May	850	24.5	3,569[6]	8.9
Operating rates	May	99%	85%	88%	82%
Inventories held by U.S. consumers	May 30	1,266	5.7		
Woodpulp shipments (export only)	May	605	15.2	2,525[6]	−1.9
Operating rates	May	97%	82%	78%	81%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Bleached paperboard: Limited capacity will tighten market

Statistics:	1982	1983	1984e
Production, 000 tons	3,665	3,918	4,100
Capacity, 000 tons[1]	4,123	4,100	4,166
Utilization rate, %	88.9	95.6	98.4
Imports, 000 tons	—	—	—
Exports, 000 tons[2]	516	525	500
Apparent U.S. consumption			
000 tons	3,149	3,393	3,600
lb/capita	27.11	29.00	30.45
000 tons/$ billion real GNP (1972)	2.11	2.21	2.21

e=Estimated.
1. Because of grade switching, capacity utilization is difficult to define.
2. API production for export.

GRADE STRUCTURE: Folding carton and milk carton stock are the primary uses for solid bleached sulfate (SBS) paperboard. Some SBS is also used for linerboard, corrugating medium, printing boards, and cups, plates and trays. Bleached boards are available in basis weights ranging from 120 to 300 lb/3,000 ft², calipers usually range from 10 to 28 pt, in low-, medium- and high-density levels. About half of the tonnage is coated.

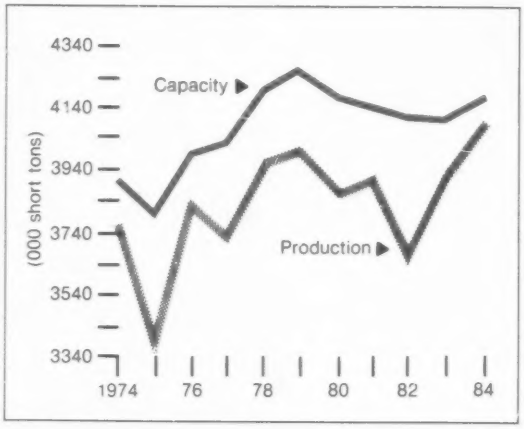
PRODUCTION/CAPACITY: Production of bleached board was up 6.9% in 1983 to 3.92 million tons after a drop of 6.3% to 3.67 million tons in 1982. As a result, operating rates increased from 88.9% in 1982 to 95.6% last year—their highest level since 1976 when the rate was 96%. Exports also were up in 1983, by 1.7% to 525,000 tons.

The increase in operating rates last year was not only due to the improved U.S. economy, but also due to a decrease in capacity by 3% to 4.1 million tons. The increase in running time was even more sharply improved in 1983 than is apparent from the figures due to machines being swung back from production of bristols, board, and market and fluff pulp. In 1982, some SBS capacity was switched to making these alternate grades due to the depressed condition of the folding carton market.

OUTLOOK: SBS markets should be tight during the next two years, with capacity increases expected to be less than 3%. Demand should not improve very much for most end uses.

Capacity should increase just 66,000 tons this year, and 89,000 tons through the next two years, reaching 4.255 million tons in 1986, according to American Paper Institute's latest survey. That figure should be adjusted upward by about 175,000 tpy because of plans announced by Westvaco earlier this year to install a new SBS machine at Covington, Va., which is scheduled to startup in 1986.

Production is expected to rise about 4% in 1984 and 2% to 3% in 1985, lifting operating rates to the 97% to 98% range. Demand for folding carton, milk carton, and cup and plate stock will remain relatively flat. SBS could continue to lose market share to clay-coated recycled and unbleached kraft board, although statistics indicate that this trend appears to be reversing. Erosion in domestic milk carton stock consumption also appears to be turning around, thanks to an industry consumer awareness campaign stressing the nutritional value of milk in paperboard cartons. Domestic milk carton stock use was up 1.9% last year, halting a long decline caused by inroads from plastic one gallon containers.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. International Paper	780	19.0
2. Potlatch	522	12.7
3. Continental Forest Industries	430	10.5
4. Westvaco	415	10.1
5. Federal Paper Board	330	8.0
6. Temple-Eastex	310	7.6
7. Champion International	265	6.5
8. James River	212	5.2
9. Weyerhaeuser	200	4.9
10. Gulf States Paper	180	4.4
11. Container Corp. of America	162	3.9
12. Gilman Paper	160	3.9
13. Georgia-Pacific	160	3.9

U.S. capacity (1984): **4.100 million short tons**
Capacity share of top five companies: 60.4%
Capacity share of top ten companies: 88.9%

PRICING: Following a deterioration in pricing in late 1982, the industry began to recover during the second half of last year with attempts to return to the mid-1981 list of $625/short ton for 15-pt coated SBS folding carton board in rolls. Discounting continued, however, keeping some transaction levels well below list.

By the second quarter of 1984, the market had strengthened sufficiently to prompt more attempts to increase prices, but the extent of the hike varied greatly with posted increases of $15 to $37.50, which brought list levels to a range of $570 to $662. By mid-year, however, the price gap had narrowed somewhat to around $600 to $662. But discounting continued into the second half of the year, keeping actual prices somewhat below posted levels.

Approximate price history for 15-pt coated SBS folding carton board in rolls in year-end quotes of $/short ton: 1973, $300; 1974, $360; 1975, $360/365; 1976, $385; 1977, $405; 1978, $425/445; 1979, $490; 1980, $550; 1981, $625; 1982, $590/625; 1983, $590/625; mid-1984, $600/662.

(News section continues on page 23)

ACQUISITIONS/MERGERS

Merger marketplace is lively

By mid-July some dust had settled on apparent acquisition tussles over three companies with forest product interests—Southwest Forest Industries Inc., Continental Group Inc., and St. Regis Corp. The outcome was mixed: one attempted merger failed, one was successful, and one appeared to be developing into a full-scale brawl.

St. Regis is reportedly prepared to wage a serious fight if two companies controlled by Australian publisher Rupert K. Murdoch attempt a takeover. Murdoch, who purchased 5.6% of St. Regis's shares in late June, has said he is only interested in St. Regis as an investment opportunity, but several events have indicated otherwise.

On July 9 St. Regis filed a suit claiming Murdoch had "embarked on a secret effort" to raise money to buy 50.1% of the company for as much as $55/share. Murdoch, according to the suit, met with bankers in London, U.K., the previous week, attempting to raise a $750-million credit line for a possible takeover of St. Regis. Murdoch was said to have estimated the gross value of St. Regis, a forest products and packaging concern with interests in insurance and energy, at $3.6 billion to $3.8 billion.

The suit alleged that Murdoch had made "patently false statements" regarding his investment intent in public filings after he had purchased the 5.6% share. In his original Securities & Exchange Commission filing, Murdoch said he did not have "any present intention to acquire control of the company." On July 10 a federal judge in Dallas, Texas, sided with Murdoch and denied St. Regis's request for a temporary restraining order barring Murdoch from acquiring any additional shares. A court hearing on the suit is scheduled for Aug. 9, however.

Separately, Murdoch was expected to file an amendment to his original SEC filing. According to Murdoch's lawyer, the amendment would confirm reports that Murdoch has been trying to line up funding for the possible purchase of additional shares of St. Regis.

Murdoch has refused a request by St. Regis chairman, William Haselton, to sign an agreement that he would not purchase any additional shares. St. Regis believes, however, Murdoch may not be able to acquire more shares—the Florida insurance commissioner has ordered Murdoch to refrain from buying more shares because of his failure to give proper notice of his original purchase.

But St. Regis was said to be expecting a tender bid from Murdoch at any time and organizing ways of fighting one. Company executives are considered to be strongly against any takeover efforts. Last year the company bought 8.6% of its stock for about $160 million from an investment group led by Sir James Goldsmith. And one effect of the company's planned acquisition of the Colonial Penn Group, valued at $590 million, is that a takeover would be more costly.

"St. Regis can best serve its shareholders and its customers by continuing as an independent corporation," said St. Regis's Haselton. The company "will not be distracted nor sidetracked from consummating as expeditiously as possible the two major transactions now on the table"—the sale of the Monticello, Miss., linerboard mill and 16 container plants to Georgia-Pacific Corp.

Continental Group's situation, in contrast with St. Regis's, has been mostly settled. On June 29 the company said its board had approved a merger agreement with a corporation owned 80% by Peter Kiewit Son's Inc. and 20% by Murdoch Investment Corp. for $58.50 in cash per share of common stock. The company said the total value of the transaction would be about $2.785 billion.

Peter Kiewit Sons is a private mining and construction company owned solely by its employees and headquartered in Omaha, Nebr. Murdoch Investment Corp. is owned by David H. Murdoch, a private investor with a major interest in Occidental Petroleum Corp.

S. Bruce Smart, chairman and CEO, said that the proposal by the Kiewit-Murdoch group was the highest price among several alternatives, was not subject to any financing contingencies, and would leave unchanged Continental's present employee compensation policies. The group "emphasized its intent to continue Continental Group as an independent viable operating company," Smart said.

"It is their desire to retain as many of our businesses as possible, but over time some assets may be divested consistent with plans previously under consideration by current management," Smart said. Smart said he believes Kiewit and Murdoch will keep the insurance operations and the packaging and pipeline operation.

Early in June Continental had received an unsolicited merger offer from a company controlled by British financier Sir James Goldsmith (*P&P*, July 1984, p. 25). But Goldsmith's final offer was said to be 50¢/share lower than the winning offer. Tenneco Inc. also reportedly made an offer that was very close to the Kiewit and Murdock bid.

Southwest Forest appears to be interested in a merger, but only in the right one. The company terminated discussions July 9 with Jefferson Smurfit on a possible takeover. Smurfit said it had offered $24/share, or $316.8 million, for all outstanding stock and obtained a $550-million line of credit from a group of commercial banks, but Southwest Forest ended the talks, citing "significant uncertainties" about Smurfit's ability to finance a merger promptly. Smurfit felt the credit line was sufficient to effect the merger, refinance existing debt, and provide working capital.

Smurfit had acquired 9% of Southwest Forest's shares in May and was believed to be interested in further expanding into the U.S. packaging company (*P&P*, July 25, p. 25).

Several months ago Southwest Forest had agreed in principle to a $24/share leveraged buy-out and debt restructuring by president and CEO, W.A. Franke, but ended the plan because of concerns over financing.

Sales and earnings in 1983.

Company	Sales	Change 1983/82	Earnings	Change 1983/82
St. Regis	$2,774,578	8.6%	$ 55,181	22.5%
Southwest Forest	636,415	19.2	(29,821)	n.m.
Continental	$4,820,000	– 3.8	199,000	10.6

( ) = Loss. n.m. = Not meaningful.

CAPACITY

Groundwood papers to lead expansion

Canadian newsprint capacity will remain flat in the 1983-86 period, and market pulp capacity will increase at just 1.2%/year, while groundwood specialties and book and writing papers lead the industry in expansion. These were among the results of the Canadian Pulp & Paper Assn.'s annual capacity survey, which has just been released.

The fastest growth rate expected for the entire Canadian industry—excluding the continued trend toward thermomechanical pulp at newsprint mills—is in printing and writing papers, with annual rises of 5.7% forecast. By contrast, "other paper" should go up just 1.5%/year and containerboard and boxboard an average of 2.0%/year each.

These rates are higher than the 1973-83 average, with printing and writing papers having gone up 5.3%/year in the last decade, other paper just 0.9%/year, containerboard 1.3%/year and boxboard 1.6%/year. The overall growth rate is being held down in comparison with the last decade by the flat trend of newsprint (after an 0.9%/year performance in 1973-83) and building paper and board (which came off of a 0.5%/year record over the last 10 years).

Market pulp growth rates of 2.3%/year in the last decade will slide to 1.2%/year in 1983-86 due to a sharp drop in bleached and semibleached kraft growth (down to 0.6%/year from 3.1%/year) and an acceleration of unbleached sulfite's fall (now dropping at 4.9%/year, compared with 2.3%/year in the previous period).

But most other market pulp grades in this survey look better than in the last decade: unbleached kraft, growing at 2.7%/year, after a 4.2%/year drop; bleached sulfite, going up 2.2%/year, after falling 0.8%/year; and dissolving and special alpha, up 4.1%/year, after a 7.0%/year tumble.

Annual capacity of Canadian pulp and paper industry, 1983-86 (000 metric tons).

Market pulp	**1983**	**1984**	**1985**	**1986**
Dissolving and special alpha	201	214	222	227
Sulfite paper grades	378	354	387	389
Sulfate paper grades	6,644	6,740	6,690	6,782
Bl. softwood	5,203	5,275	5,257	5,399
Semibl. softwood	453	446	443	441
Bl. hardwood	780	799	765	717
Unbl.	208	220	225	225
Total chemical paper grades[1]	**7,022**	**7,094**	**7,077**	**7,171**
Increase from previous year	182	72	−17	94
	2.7%	1.0%	−0.2%	1.3%
Mechanical	418	527	527	527
Total market pulp capacity	**7,641**	**7,835**	**7,826**	**7,925**
Increase from previous year	24	194	−9	99
	0.3%	2.5%	−0.1%	1.3%

1. Excluding dissolving and special alpha.

Paper and board				
Newsprint	9,970	9,935	10,000	9,970
Groundwood printing	800	840	935	960
Book, writing, misc.	1,026	1,118	1,182	1,198
Kraft papers	554	555	558	564
Special papers	37	37	37	37
Containerboard	1,794	1,870	1,894	1,905
Boxboard	767	787	800	814
Total	**15,397**	**15,603**	**15,891**	**15,935**
Building, other	751	750	751	752
Total paper, board capacity	**16,148**	**16,353**	**16,642**	**16,687**
Increase from previous year	112	205	289	45
	0.7%	1.3%	1.8%	0.3%

Source: Canadian Pulp & Paper Assn.

Market pulp. Market pulp capacity will rise just 284,000 metric tons during the 1983-86 period, to 7.9 million tpy, and 109,000 tons of that increase will come from mechanical pulp. (The mechanical pulp rise is deceptive since it reflects the conversion of Consolidated-Bathurst Inc.'s Bathurst, N.B., mill from chemical to thermomechanical pulp—even though the resulting pulp is intended for shipment to Con-Bath's Bridgewater newsprint mill in the U.K.)

Paper-grade sulfate market pulp will rise just 138,000 tons, or 2.1%, during the entire period. The 0.7%/year rate this implies is just a quarter of the 1973-83 rate. However, bleached softwood kraft is rising by 196,000 tons, or 3.8% over the period, due to conversions by several mills from bleached hardwood.

Total pulp. Pulp capacity for all grades should rise by 3.5% to 24.2 million tpy by the end of 1986, maintaining the growth rate of the last 10 years. Expansions at E.B. Eddy Forest Products Ltd.'s Espanola, Ont., mill, at Northwood Pulp & Timber Ltd.'s Prince George, B.C., mill, and Western Pulp Partnership Ltd.'s Squamish, B.C., mill account for the planned increase in bleached kraft pulp. Rebuild of Fraser Inc.'s Atholville, N.B., mill is boosting bleached sulfite, while expansions at Tembec Inc.'s Temiscaming, Que., installation and Western Pulp's Port Alice, B.C., mill will increase dissolving/special alpha.

Newsprint. Newsprint capacity will fluctuate within a range of 65,000 tons during the survey period, ending 1986 at the same 9.97-million-ton level as it began the period in 1983. Machine shutdowns and upgrades to groundwood specialties should offset replacements and modernizations.

Groundwood specialties. Conversion of newsprint machines to uncoated groundwood at three mills will boost capacity for groundwood specialties by 20.5%, or 160,000 tons. The three mills are Abitibi-Price Inc.'s Beaupre, Que., facility, MacMillan Bloedel Ltd.'s Port Alberni, B.C., mill, and St. Raymond Paper Ltd.'s Chute Panet, Que., mill.

Book, writing, sanitary papers. An even larger increase is represented by book and writing papers, although this is from a higher base than groundwood specialties. Book and writing capacity will rise by 172,000 tons, or 16.8%. In the sanitary paper area, capacity will rise by 8.5%, or 38,000 tons.

Paperboard. Miscellaneous improvements and mills will be responsible for the 11.4% increase, to 361,000 tons, for folding boxboard (excluding solid bleached). Recycled corrugating medium capacity is expected to rise by 27.4%, or 32,000 tons, while recycled liner goes up 5.6%, or 16,000 tons, and kraft liner rises 5.2%, or 45,000 tons.

CAPITAL SPENDING

U.S. papermakers to boost 1984 outlays

Enjoying high operating rates and greatly improved earnings, U.S. papermakers have again revised their 1984 capital spending plans upward, according to a recently released Commerce Dept. survey conducted in April and May.

Paper companies now plan to spend a record $7.17 billion in 1984 on new plant and equipment, up 16.0% from 1983 spending of $6.18 billion, according to the Commerce Dept. The previous survey, conducted in January and February, showed the paper industry planning to spend $7.13 billion in 1984, up 15.4% from last year. In a second recently conducted survey, McGraw-Hill Economics forecast U.S. paper industry outlays of $6.67 billion in 1984, up 7.9% from 1983.

Record spending plans. Spending for new plant and equipment at U.S. paper mills reached a seasonally adjusted annual rate of $6.93 billion in the first quarter, the Commerce Dept. reported. Spending is expected to increase to an annual rate of $7.20 billion in the second quarter, $7.13 billion in the third, and $7.42 billion in the fourth, easily surpassing the old mark. Industry expenditures peaked in 1980 at $6.80 billion before dropping during the recession to a low of $5.97 billion in 1982.

Canadian recovery. Canadian producers have recovered sufficiently to plan a modest increase in capital spending for 1984, according to a Statistics Canada survey completed in February. Canadian paper companies reported plans to spend C$1.09 billion this year, up 2.8% from 1983. Recovering much slower from the recession than U.S. firms, Canadian papermakers reduced capital outlays 43.0% last year and 16.1% in 1982, and an increase this year would end three straight years of decline in capital outlays.

Quebec will benefit the most from the planned increases, with capital expenditures up 22.7% to $522.0 million. Outlays in Ontario are expected to reach $274.9 million, up 7.8%, while spending in British Columbia—where spending dropped from $366.1 million in 1982 to $100.7 million last year—is seen rising to $126.8 million, up 7.4%.

Planned expenditures for machinery and equipment account for 90.% of the total, the survey shows, with construction accounting for the remaining 10%. New machinery and equipment purchases will rise 5.2% this year to $979.5 million, the study reports.

North American paper industry capital spending estimates for 1984 (billions of $).

United States	1984e	1983	1982	% change 1984/83
Commerce Dept.[1]				
Paper and allied	$ 7.17	$ 6.18	$ 5.97	16.0
All manufacturing	128.76	111.53	119.68	15.4
McGraw-Hill[2]				
Paper and pulp	6.67	6.18	5.97	7.9
All manufacturing	141.79	111.53	119.68	27.1
Canada				
Statistics Canada[3]				
Paper and allied	C$1.09	C$1.06	C$1.86	2.8
All manufacturing[4]	8.58	8.80	11.49	−2.5

1. Survey conducted April/May.
2. Survey conducted March/April.
3. Survey conducted December/February.
4. Excludes repair expenditures.

U.S. paper industry environmental spending plans for 1984 (millions of $).

	1984e	1983	1982	% change 1984/83
Air	$220	$160	$150	37.5%
Water	100	70	90	42.9
Solid waste	70	20	60	250.0
Total	390	250	300	56.0
% of total capital expenditures	5.5%	4.0%	5.0%	

Source: Commerce Dept.

Environmental spending may climb

U.S. paper industry spending for pollution abatement is expected to rise sharply in 1984, reversing a steady decline in environmental outlays as a percentage of total capital expenditures, reports the latest Commerce Dept. survey of environmental spending.

The Commerce Dept. report, based on surveys conducted in January and February, estimates 1984 paper industry outlays for pollution control of $390 million, up 56% from the $250 million spent last year. As a percentage of total capital expenditures, pollution abatement outlays are expected to rise to 5.5% in 1984, up from 4.0% last year and 5.0% in 1982, the Commerce Dept. reports. If carried out, this would reverse the steady decline in environmental outlays from the peak reached in the mid-1970s.

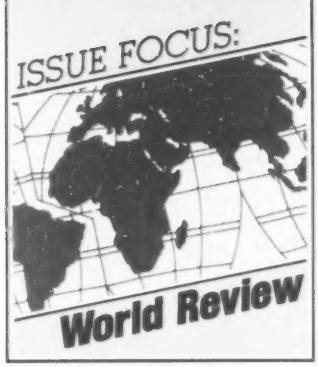
U.S. business as a whole plans to increase spending for pollution abatement in 1984 to $7.6 billion, up 5.5% from the $7.2 billion spent last year, the Commerce report indicates. This would mark the first increase since 1980.

As in the past, air pollution controls are expected to consume the largest share of papermakers' environmental funds, but spending in the water and solid waste categories are continuing to gain in importance.

Conflicting results. In sharp contrast to the Commerce Dept. study, a recent survey of environmental spending plans conducted by McGraw-Hill found that the pulp and paper industry planned to spend $324 million on pollution control in 1984, down 22.2% from $416 million spent in 1983. This translates into a decline in environmental outlays as a percentage of total capital spending to 4.9% in 1984, compared with 6.7% in 1983. The major discrepancy between the Commerce Dept. and McGraw-Hill is in total 1983 environmental spending, where Commerce reported $250 million and McGraw-Hill, $416 million.

Outlays for water pollution control are seen dropping 32% in 1984 to $110 million, down from $162 million in 1983, according to the McGraw-Hill report.

Air pollution and solid waste are both expected to drop 16%, with air pollution spending of $128 million in 1984 down from $153 million last year and the solid waste category down to $85 million this year from $101 million in 1983.



WORLD PULP AND PAPER INDUSTRY: strong recovery sets new records

Pulp and paper demand in 1983-84 boomed as the U.S. industry led the recovery; only a newsprint glut and the strong dollar cloud forecasts

By PETER SUTTON, DAVID O'DONOGHUE, and JOHN KALISH, International Editors

■ The world's pulp and paper industry saw the first signs of a much-needed recovery in 1983. The pickup in demand began in the U.S. in mid-year and had spread to most other countries by end-1983. Several, including the U.S., Japan, Sweden and Fed. Rep. Germany, set new annual records for paper and board output. Recovery continued into the first half of 1984 with pulp and paper price rises succeeding in most major markets.

After falling 1.9% in 1982, world paper and board production rose 6.4% in 1983 to reach an all-time record of 177 million tons. Pulp output was up 6.7% at 131 million tons (after a 1982 drop of 4.4%). Consumption of paper and board rose 6.1% to 177 million tons with average per capita consumption at 85.5 lb (38.8 kg).

The estimated number of paper mills in the world rose by 39 to 6,010, as reported to *Pulp & Paper International*, but the world's papermaking capacity dropped by 0.2%, or 456,000 tons, to 198 million tons. Pulp production capacity declined even more, by 2.6%, or just over 4 million tons, to 148 million tons, and the total number of pulp mills fell 15 to 1,411.

All the main regions of the world had higher output of pulp and paper, with the exception of Australasia, where Australian production fell below the previous year, partly because of a severe drought. Another bad drought affected the South African industry, where total paper and board production also declined.

U.S. LEADS THE WAY. The world's biggest producer and consumer of pulp and paper led the way back to profitability, and the strong U.S. dollar continued to be a dominating factor on international markets. The U.S. turnaround began in mid-1983 with a surge in orders mostly for printing/writing grades. Producers of most grades were easily able to push through price increases as the year progressed.

The economic recovery that drove the improvement in the pulp and paper business was also sufficiently strong to enhance the fortunes of most major international paper companies. The Swedish industry in particular really enjoyed a boom year, helped in the export markets by its currency devaluation at end-1982 and the strong U.S. dollar.

Total Norscan market pulp shipments reached a record level of just over 16 million tons in 1983, nearly 19% above the previous, weak year. The average 1983 operating rate was 10 points above 1982 at 87.6%. The pulp market gradually improved through 1983 with some successful price increases. It was not, however, a steady improvement, and some suppliers had trouble holding sales to list prices. Despite the record Norscan shipments, the market still looked uncertain in early 1984.

In this review, data from all countries, including the U.S., are reported in metric tons. All data conform with FAO definitions: thus, paper/board totals do not include insulation board; pulp figures exclude screenings, defibrated, and exploded pulps.

Production by continents, world total (000 metric tons)

	PULP					PAPER AND PAPERBOARD					
	1960	1970	1980	1982	1983		1960	1970	1980	1982	1983
North America	32,964	54,912	65,969	61,762	66,882	North America	38,917	58,914	70,225	66,373	72,202
Europe	20,965	34,853	40,235	36,858	39,271	Europe	25,634	45,159	59,023	58,181	60,508
Asia/Australasia	5,156	14,268	18,239	17,308	17,658	Asia/Australasia	7,861	20,621	31,962	32,334	34,646
Latin America	821	2,224	5,848	5,162	5,539	Latin America	1,656	3,712	7,737	7,815	8,092
Africa	124	900	1,502	1,720	1,772	Africa	288	892	1,717	1,826	1,828
World total	**60,031**	**107,157**	**131,793**	**122,810**	**131,122**	**World total**	**74,355**	**129,298**	**170,664**	**166,529**	**177,276**

REVIEW OF TOP 26 NATIONS IN PULP/PAPER PRODUCTION

Abridged data on production and export/import trade are given for countries included in the Top 20 tables for paper and board production and for pulp production

Australia

Population: 15,370,800. Per capita consumption of paper and board; 127 kg/281 lb. Paper and board mills: 16. Pulp mills: 18 (sulfate: 2; sulfite: 1; soda: 2; semichemical: 4; mechanical: 8; nonwood: 1)

Paper/board capacity: 1,750,000e tons **Pulp capacity:** 1,155,000e tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Newsprint and other printing paper	548	569	432	346	14	—
Other paper and board	948	882	196	228	61	—
Total	**1,496**	**1,451**	**628**	**574**	**75**	**—**
Chemical woodpulp	479	—	241	212	—	6
Other pulps	226	—	1	4	—	—
Total	**705**	**618**	**242**	**216**	**—**	**6**

Austria

Population: 7,551,000. Per capita consumption of paper and board; 109 kg/241 lb. Paper and board mills: 35. Pulp mills: 18 (sulfate: 2; sulfite: 8; semichemical: 1; mechanical: 7)

Paper/board capacity: 2,062,000 tons **Pulp capacity:** 1,222,000 tons
Operating rate 1983: 87% **Operating rate 1983:** 85%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	961	1,014	127	158	628	720
Board/wrapping paper	746	775	84	91	471	487
Total	**1,707**	**1,789**	**211**	**249**	**1,099**	**1,207**
Chemical woodpulp	853	850	183	220	221	224
Other pulps	336	319	18	17	12	12
Total	**1,189**	**1,169**	**201**	**237**	**233**	**236**

Brazil

Population: 126,500,000. Per capita consumption of paper and board; 26 kg/57 lb. Paper and board mills: 160. Pulp mills: 48.

Paper/board capacity: n.a. **Pulp capacity:** n.a.

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	2,013	2,055	249	252	197	262
Board	1,301	1,365	—	—	54	139
Total	**3,314**	**3,420**	**249**	**252**	**251**	**401**
Chemical woodpulp	2,898	2,917	12	8	775	1,011
Other pulps	—	—	1	5	—	—
Total	**2,898**	**2,917**	**13**	**13**	**775**	**1,011**

Canada

Population: 24,900,000. Per capita consumption of paper and board; 188 kg/414 lb. Paper and board mills: 107. Pulp mills: 34.

Paper/board capacity: 15,397,000 tons **Pulp capacity:** 23,418,000 tons
Operating rate 1983: 85% **Operating rate 1983:** 84%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	10,425	11,069	220	291	8,101	8,602
Board	1,983	2,284	149	167	384	518
Total	**12,408**	**13,353**	**369**	**458**	**8,485**	**9,120**
Chemical woodpulp	9,956	11,212	87	97	5,372	6,352
Other pulps	7,051	8,009	59	56	450	443
Total	**17,007**	**19,221**	**146**	**153**	**5,822**	**6,795**

China, People's Rep. of

Population: 1,024,950,000. Per capita consumption of paper and board: 6.8 kg/15 lb. Paper and board mills: 1,600e.

Paper/board capacity: 7,280,000 tons **Pulp capacity:** 6,190,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	3,233	3,570	149	n.a.	106	n.a.
Packag. ,g paper/board	2,657	3,043	381	n.a.	92	n.a.
Total	**5,890**	**6,613**	**530**	**518**	**198**	**n.a.**
Chemical woodpulp	760	775	396	n.a.	—	n.a.
Mechanical pulp	335	342	—	n.a.	—	n.a.
Reed, bamboo, other pulps	3,344	3,608	82	n.a.	—	n.a.
Total	**4,439**	**4,725**	**478**	**731**	**—**	**n.a.**

Czechoslovakia

Population: 15,000,000. Per capita consumption of paper and board; 76 kg/168 lb. Paper and board mills: 49. Pulp mills: 24 (sulfate: 5; sulfite: 7; semichemical: 1; mechanical: 10; nonwood: 1)

Paper/board capacity: 1,311,000 tons **Pulp capacity:** 1,031,000 tons
Operating rate 1983: 96% **Operating rate 1983:** 95%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	709	722	41	41	92	88
Board	538	536	84	67	100	86
Total	**1,247**	**1,258**	**125**	**108**	**192**	**174**
Chemical woodpulp	727	771	56	61	60	86
Other pulps	232	206	29	41	3	3
Total	**959**	**977**	**85**	**102**	**63**	**89**

Finland

Population: 4,857,000. Per capita consumption of paper and board; 168 kg/370 lb. Paper and board mills: 46. Pulp mills: 51 (sulfate: 18; sulfite: 8; semichemical: 3; mechanical: 22)

Paper/board capacity: 7,550,000 tons **Pulp capacity:** 8,872,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	4,444	4,825	14	14	3,664	4,042
Board	1,451	1,563	28	37	1,168	1,215
Total	**5,895**	**6,388**	**42**	**51**	**4,832**	**5,257**
Chemical woodpulp	4,103	4,379	10	13	1,278	1,404
Other pulps	2,611	2,784	45	19	179	168
Total	**6,714**	**7,163**	**55**	**32**	**1,457**	**1,572**

France

Population: 54,000,000. Per capita consumption of paper and board; 121 kg/267 lb. Paper and board mills: 165. Pulp mills: 26 (sulfate: 7; sulfite: 4; semichemical: 6; mechanical: 9)

Paper/board capacity: 5,500,000 tons **Pulp capacity:** 2,250,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	3,077	3,104	1,425	1,483	821	832
Board	2,050	2,157	887	958	300	360
Total	**5,127**	**5,261**	**2,312**	**2,441**	**1,121**	**1,192**
Chemical woodpulp	1,342	1,455	1,461	1,502	167	213
Other pulps	423	407	58	65	2	4
Total	**1,765**	**1,862**	**1,519**	**1,567**	**169**	**217**

but got a boost from the two-and-a-half-month shutdown of Canada's British Columbia market pulp mills.

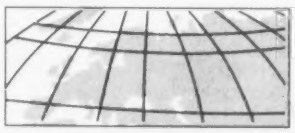
Still too much newsprint. World newsprint production in 1983 recovered from a 3% drop in 1982, to reach 25.9 million tons, 3% over 1982. But newsprint remained the weak sector of the paper industry, mainly because of continuing oversupply. And new newsprint production capacity is due to come online over the next few years, particularly in Europe.

Printing/writing papers on the other hand, enjoyed considerable demand growth in 1983, which continued into 1984. Many magazine grades, including lightweight coated, were on allocation up to at least mid-1984 in both the U.S. and western Europe. 1983 output of printing/writing grades was 43.7 million tons, up 7.8%.

In the **packaging paper and board** sector, 59.4 million tons were produced in 1983, a 6.4% increase over 1982, more directly reflecting the general increase in manufacturing output by most of the bigger countries in 1983. **Kraft linerboard** prices remained depressed in 1983, causing the European Economic Community to enforce minimum price levels to avoid dumping. Dumping was also reported in Asian markets. The high dollar rate coupled with weak local currencies meant that European producers got the better of U.S. linerboard mills by following the downward price trend.

The economic pickup raised demand, however, and from mid-1983 to mid-1984, linerboard prices rose 22% in dollar terms, nearly 40% when expressed in major European currencies. Brazil and South Africa are set to become important linerboard exporters to world markets with extra capacity coming onstream in 1984-85.

'84 OUTLOOK FAIR. The pulp and paper business improved even more during first-quarter 1984, with two successful market pulp price hikes going through both in the U.S. and Europe, while paper prices also climbed in most of the big producing nations. Closure of western Canadian mills during the quarter helped strengthen both pulp and newsprint markets and secure price increases. By mid-1984, many producers were confident new output levels could be reached by year-end. But others were seeing the first signs of a slowdown in demand and wondering if the recovery would last the year.



EUROPE

THE YEAR 1983 was one of recovery for the European paper industry with production, consumption and profits all improving over 1982 levels and drawing closer to the 1981 position. It was obvious from the third quarter that the economic pickup in the U.S. was making its effects felt on the other side of the Atlantic.

While paper and board production in all of Europe (East and West) rose 3.9% in 1983, pulp output rose 6.5%. By far the greatest production increases took place in **Scandinavia** where the joint Finnish, Norwegian and Swedish output total of paper and board reached 14.1 million tons, up 7.5%. Scandinavian pulp output rose by an impressive 9.5% to 17.4 million tons.

Reflecting their improved output performance coupled with the international market upswing, forest product companies in **Sweden** reported total 1983 earnings of $630 million on sales of $6.685 billion. The Swedish Pulp & Paper Assn. forecast that the total value of forest industry exports in the mid-1984 to mid-1985 period will reach $6.433 billion.

Paper and board output in the nine EEC producing states (Luxembourg does not make any paper) rose moderately, up 1.9%, to 24.1 million tons, while pulp output rose 3.6% to 5.5 million tons. In the East European bloc, paper and board production was up 4.3% at 16.1 million tons, and pulp output rose 4.8% to 12.3 million tons.

Fed. Rep. Germany remained Western Europe's biggest paper/board producer with a record 1983 output of 8.27 million tons (7.78 million in 1982). **Finland** came second, with 6.38 million tons (vs 5.89 million in 1982),

World's top 20 producing and consuming countries

PAPER AND BOARD PRODUCTION (000 metric tons)			PULP PRODUCTION (000 metric tons)			PER CAPITA CONSUMPTION (lb/year)		
	1983	% change 1983/82		1983	% change 1983/82		1983	% change 1983/82
1. U.S.	58,849	9.1	1. U.S.	47,661	6.5	1. U.S.	589	6.8
2. Japan	18,442	5.7	2. Canada	19,221	13.0	2. Sweden	467	5.0
3. Canada	13,353	7.6	3. Japan	8,860	2.7	3. Canada	414	7.4
4. U.S.S.R.	9,556	6.4	4. Sweden	8,668	12.5	4. Denmark	373	1.8
5. Fed. Rep. Germany	8,272	6.3	5. U.S.S.R.	7,913	6.3	5. Finland	370	5.0
6. People's Rep. China	6,613	12.3	6. Finland	7,163	6.7	6. Switzerland	362	5.1
7. Finland	6,388	8.4	7. People's Rep. China	4,725	6.4	7. Fed. Rep. Germany	353	5.3
8. Sweden	6,350	7.3	8. Brazil	2,917	0.7	8. Netherlands	348	3.9
9. France	5,261	2.6	9. Fed. Rep. Germany	2,081	3.8	9. Japan	337	4.8
10. Italy	4,259	-6.9	10. France	1,862	5.5	10. Belgium	335	6.3
11. Brazil	3,420	3.2	11. Norway	1,640	7.8	11. New Zealand	324	2.8
12. U.K.	3,209	0.3	12. Spain	1,412	3.8	12. Norway	287	—
13. Spain	2,754	2.6	13. Austria	1,169	-1.7	13. Australia	280	-5.9
14. Mexico	2,062	3.8	14. South Africa	1,165	—	14. U.K.	278	5.9
15. Korea, Rep.	1,982	14.1	15. New Zealand	1,073	3.2	15. France	267	3.4
16. Austria	1,789	4.8	16. Portugal	1,042	9.5	16. Hong Kong	262	-0.8
17. Netherlands	1,737	6.4	17. Czechoslovakia	977	1.8	17. Austria	240	4.8
18. Taiwan	1,720	10.5	18. Poland	871	7.1	18. Iceland	225	13.3
19. Australia	1,451	-3.0	19. India	850	—	19. Singapore	212	43.3
20. Norway	1,368	4.9	20. Romania	845	3.7	20. Taiwan	203	5.7

and **Sweden** third with 6.35 million (5.91 million in '82).

Major expansions in 1983 were: a 200,000-tpy sulfite market pulp mill in **Czechoslovakia**; a 160,000-tpy newsprint machine plus a 1,330-tpd pressurized groundwood line at Tampella's Anjala mill, **Finland**; a 160,000-tpy fine paper machine at Kymi Kymmene in **Finland** and a similar paper machine at the Svetogorsk combine in Karelia, **U.S.S.R.**; a corrugating medium machine at Kombinat Belišće, **Yugoslavia**, and a 150,000-tpy newsprint machine at Gebruder Lang, **Fed. Rep. Germany**.

More capacity increases. The 1984-85 period will see much more capacity coming onstream. The cost of 1984 pulp and paper mill expansion investments in Europe alone is put at $1.340 billion.

Among the biggest expansions planned in Europe for 1984 are: a 170,000-tpy linerboard and liquid packaging board machine at Nettingsdorf Papier, and a 150,000-tpy newsprint machine at Steyrermühl, both in **Austria**; the 300,000-tpy market pulp mill of Soporcel in **Portugal**; a 60,000-tpy printing/writing grades machine at Szolnok in **Hungary**; and a 75,000-tpy printing/writing paper machine at Kwidzyn in **Poland**.

In mid-1984, some big capacity expansions in **Sweden** were announced. They include: a new 180,000-tpy newsprint machine at Holmens Bruk's Braviken mill for September 1985 startup; a 210,000-tpy newsprint machine at SCA's Ortviken mill for February 1986 startup; a 125,000-tpy uncoated free-sheet machine at MoDo's Husum mill for October 1985 startup; and a 225,000-tpy liquid packaging board machine at Billerud's Gruvön mill for December 1986 startup.

With many of Europe's capacity expansions coming from outside the ten EEC nations, the EEC paper industry reacted nervously to what it saw as a possible tidal

TOP 26 PRODUCING NATIONS *(Continued)*

Fed. Rep. of Germany

Population: 61,421,000. Per capita consumption of paper and board: 160 kg/353 lb. Paper and board mills: 206. Pulp mills: 37 (sulfite: 10; semichemical: 1; mechanical: 26)

Paper/board capacity: 9,091,000 tons **Pulp capacity:** 2,125,000 tons
Operating rate 1983: 91% **Operating rate 1983:** 98%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	5,126	5,479	2,534	2,718	1,401	1,604
Board	2,657	2,793	1,138	1,221	681	784
Total	**7,783**	**8,272**	**3,672**	**3,939**	**2,082**	**2,388**
Chemical woodpulp	792	800	2,345	2,703	96	114
Other pulps	1,212	1,281	64	73	6	—
Total	**2,004**	**2,081**	**2,409**	**2,776**	**102**	**114**

Italy

Population: 56,800,000. Per capita consumption of paper and board: 86 kg/190 lb. Paper and board mills: 430. Pulp mills: 30 (sulfite: 2; semichemical: 5; mechanical: 16; nonwood: 7)

Paper/board capacity: 5,350,000 tons **Pulp capacity:** 1,050,000 tons
Operating rate 1983: 80% **Operating rate 1983:** 75%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	2,574	2,468	672	834	619	620
Board	1,999	1,791	429	539	170	158
Total	**4,573**	**4,259**	**1,101**	**1,373**	**789**	**778**
Chemical woodpulp	188	213	1,268	1,276	19	40
Other pulps	628	574	90	103	—	1
Total	**816**	**787**	**1,358**	**1,379**	**19**	**41**

Japan

Population: 119,483,000. Per capita consumption of paper and board: 153 kg/338 lb. Paper and board mills: 593. Pulp mills: 65 (sulfate: 37; sulfite: 3; semichemical: 11; mechanical: 18; nonwood: 3)

Paper/boasrd capacity: 23,198,000 tons **Pulp capacity:** 12,459,000 tons
Operating rate 1983: 80% **Operating rate 1983:** 71%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	10,351	10,932	351	402	411	365
Board	7,099	7,510	278	280	329	373
Total	**17,450**	**18,442**	**632**	**682**	**740**	**738**
Chemical woodpulp	6,508	6,738	1,274	1,516	66	43
Other pulps	2,118	4,239	479	657	2	2
Total	**8,626**	**8,859**	**1,753**	**2,173**	**68**	**45**

Korea, Rep. of

Population: 39,331,000. Per capita consumption of paper and board: 49 kg/108 lb. Paper and board mills: 170e. Pulp mills: 5 (sulfate: 1; mechanical: 4)

Paper/board capacity: 2,180,000e tons **Pulp capacity:** 314,000 tons
Operating rate 1983: 89% **Operating rate 1983:** 79%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	893	1,035	25	36	70	52
Board	844	947	12	16	45	46
Total	**1,737**	**1,982**	**37**	**52**	**115**	**98**
Chemical woodpulp	108	116	377	453	—	—
Other pulps	127	126	59	59	—	—
Total	**235**	**242**	**436**	**512**	**—**	**—**

Mexico

Population: 77,000,000. Per capita consumption of paper and board: 29 kg/64 lb. Paper and board mills: 66. Pulp mills: 23 (sulfate: 10; sulfite: 1; mechanical: 1, nonwood: 10)

Paper/board capacity: 2,957,000 tons **Pulp capacity:** 1,078,000 tons
Operating rate 1983: 69% **Operating rate 1983:** 70%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	1,123	1,166	211	87	—	—
Board	864	895	70	59	—	—
Total	**1,987**	**2,061**	**281**	**146**	**—**	**—**
Chemical woodpulp	422	414	110	145	—	—
Other pulps	326	345	18	9	—	—
Total	**748**	**759**	**128**	**154**	**—**	**—**

Netherlands

Population: 14,360,000. Per capita consumption of paper and board: 158 kg/348 lb. Paper and board mills: 35. Pulp mills: 3 (mechanical: 2; nonwood: 1)

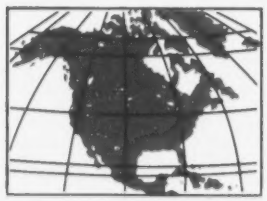
Paper/board capacity: 1,878,000 tons **Pulp capacity:** 152,000 tons
Operating rate 1983: 93% **Operating rate 1983:** 99%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	801	880	933	1,010	448	529
Board	832	857	463	504	404	466
Total	**1,633**	**1,737**	**1,396**	**1,514**	**852**	**995**
Chemical woodpulp	—	—	470	521	7	3
Other pulps	136	147	30	28	4	1
Total	**136**	**147**	**500**	**549**	**11**	**4**

wave of high-quality, duty-free (since Jan. 1, 1984) paper flooding the EEC market from countries in the European Free Trade Assn. (EFTA). The EEC paper industy confederation, Cepac, announced it was watching developments closely and would prepare regular reports on import levels for the EEC. Cepac's main message to the big Scandinavian producers is to concentrate their export efforts on a worldwide basis, not just in the EEC.

EEC/Canada dispute. A dispute between the EEC and Canada over the level of Canadian duty-free newsprint exports in 1984 to the EEC was referred to the General Agreement on Tariffs & Trade regulation body in Geneva for a ruling expected in late-1984. In addition, the EEC investigation into an alleged market pulp cartel continued without solutions in sight. Possible changes in the U.S. dollar-based system for sales of market pulp in the EEC were being examined by lawyers from the EEC Commission and the major market pulp companies.



NORTH AMERICA

THE ECONOMIC RECOVERY, which took hold firmly in the **U.S.** about mid-1983, brought a surge of response for the pulp and paper industry in North America in the second half of the year. It was enough to result in new output records in the U.S. and bring the industry in **Canada** back to good operating levels by the end of the year.

Total North American output of paper and board last year soared by 8.8% to a record 72.2 million tons. The magnitude of the recovery is even better seen in the absolute tonnage increase—almost 6 million tons—which is equivalent to the annual output of Sweden or Finland.

Led by an 11% surge in output of printing and writing grades, the U.S. industry produced 58.85 million tons of paper and board, 4% over the previous high set in 1981. Significantly, production ran at an average annual rate of some 62 million tons during the last four months of the year, compared with only a 57-million-ton rate during the first half. Total pulp output rose 6.5% to 47.7 million tons, while market pulp output jumped 13% to a new record 5.9 million tons.

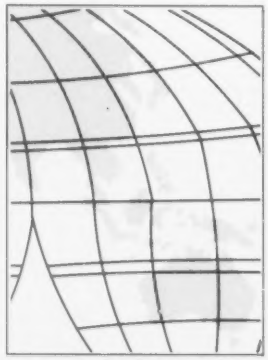
In Canada, the turnaround in market pulp shipments was even more dramatic, up 18% over 1982, but short of the previous record set in 1981. Similarly, although Canada's newsprint mills operated at good rates by year-end, total shipments were up only 5% to 8.45 million tons, far off the 1981 record of 8.9 million tons. Canada's overseas newsprint exports actually dropped 7%, due to sluggish demand in Europe and weak economic conditions in Latin America, according to the Canadian Pulp & Paper Assn. However, Canada's overseas exports are also certainly being affected by increased capacity added in Europe (Fed. Rep. Germany and the U.K.) during the past 18 months, self-sufficiency projects in several Latin American countries, plus the advent of South Africa as a new newsprint exporter.

Canada is currently fighting an EEC attempt to slash the annual non-EFTA nations' duty-free newsprint quota from 1.5 million tons to only 500,000 tons. At mid-1984, the problem had still not been resolved.

The outlook for this year is quite positive, and it appears certain that new record levels will be set in almost every category in the U.S. U.S. paper and board production continued at its record-breaking 62-million-tpy rate during the first quarter of this year, and it appears to have held this through the second quarter. Similar strong rates have been registered for both pulp and wastepaper demand.

Profitability, which also recovered strongly during the fourth quarter of 1983, will certainly benefit from the price increases that have been achieved for most products since the start of this year. The industry's capital expenditures have also continued to climb and are estimated at $7.0 billion for 1984.

In Canada, newsprint shipments are expected to rise another 9% this year to a new record, with mills operating at 93% of capacity. In the market pulp sector, considerable tonnage was lost by the long lockout in British Columbia mills early this year, but the CPPA still expects shipments to rise 7% to a record 7.4 million tons.



ASIA/ AUSTRAL-ASIA

IN ASIA, production of both pulp and paper in 1983 were at substantially higher levels than the previous year. The rise in paper and board output was the biggest for at least the last seven years: up nearly 8% at 32.5 million tons. Pulp production went up less, 2.6%, to just under 16 million tons.

In contrast, 1983 paper and board output in Australasia, effectively **Australia** and **New Zealand**, was lower than 1982, making it the only region to see production decline in 1983. It dropped by 3.7% to 2.12 million tons. Output has stayed in the 2.0- to 2.2-million-ton region since 1979. Apparent consumption was down 3.6% at 2.46 million tons, and pulp production fell by 3%, to 1.69 million tons.

Of the big five in Asia, **Japan** reached a new record level for paper and board output of 18.4 million tons, up 5.7% from 1982. Japan remains the major producer in Asia by far: as usual, it produced over 50% of the region's output.

Like the economies of some other nations, the improvement in the Japanese economy was fueled by exports to the U.S. in the first half of 1983, followed by higher domestic demand in the second. Japan raised newsprint and linerboard imports and, following U.S. and EEC pressure, is reducing its import duty on paper products on a shorter time-scale. Domestic industry continues to rationalize with company mergers and agreements to cut overall paper and board capacity. However, there are still several major capital investments going through that will improve not only product quality but also efficiency.

Rep. of Korea and **Taiwan** both had improved market conditions in 1983 and, like Japan, are optimistic about 1984. Rep. of Korea recovered completely with paper output up 14% to just under 2 million tons. Newsprint markets remained the one weak area (as was the case in Japan and some other Asian countries). In Taiwan, 1983 output

WORLD PULP, PAPER, AND BOARD

	Popu-lation (000)	Number of mills P&B	Number of mills Pulp	CAPACITY (000 m tons) P&B	CAPACITY (000 m tons) Pulp	Per capita (lb)	CONSUMPTION (000 m tons) P&B 1982	CONSUMPTION (000 m tons) P&B 1983	CONSUMPTION (000 m tons) Pulp 1982	CONSUMPTION (000 m tons) Pulp 1983	PRODUCTION (000 m tons) P&B 1982	PRODUCTION (000 m tons) P&B 1983	PRODUCTION (000 m tons) Pulp 1982	PRODUCTION (000 m tons) Pulp 1983
EUROPE														
Belgium	9,900	16	3	1,279	342	335.1	1,411	1,505	588	614	827	837	323	326
Denmark	5,116	6	3	375	135	373.7	850	867	154	178	279	319	111	111
France	54,000	165	26	5,500	2,250	266.1	6,292	6,516	3,115	3,210	5,127	5,261	1,765	1,862
Germany, Fed. Rep.	61,421	206	37	9,091	2,125	352.5	9,371	9,822	4,311	4,713	7,783	8,272	2,004	2,081
Greece	9,700	19	4	385	65	104.1	445	458	155	195	260	273	43	45
Ireland	3,200	2	0	50e	0	186.1	270e	270e	20e	20e	20	20	0	0
Italy	56,800	430	30	5,350	1,050	190.0	4,884	4,854	2,155	2,125	4,574	4,259	816	787
Netherlands	14,360	35	3	1,878	152	348.3	2,177	2,256	625	643	1,633	1,737	136	147
United Kingdom	55,950	102	3	3,497	126	278.7	6,750	7,070	1,489	1,654	3,198	3,209	141	173
EEC	**270,447**	**981**	**109**	**27,405**	**6,245**	**274.0**	**32,450**	**33,618**	**12,612**	**13,352**	**23,721**	**24,187**	**5,339**	**5,532**
Finland	4,857	46	51	7,550	8,872	370.3	1,105	1,182	5,312	5,623	5,895	6,388	6,714	7,163
Norway	4,130	23	27	1,785	2,170	286.6	527	533	1,249	1,243	1,304	1,368	1,522	1,640
Sweden	8,330	56	57	7,135	9,443	467.4	1,675	1,858	5,323	5,699	5,918	6,350	7,706	8,668
Scandinavia	**17,317**	**125**	**135**	**16,470**	**20,485**	**397.0**	**3,307**	**3,573**	**11,884**	**12,565**	**13,117**	**14,106**	**15,942**	**17,471**
Austria	7,551	35	18	2,062	1,222	240.3	819	831	1,157	1,170	1,707	1,789	1,189	1,169
Iceland	235	0	0	0	0	225.1	21	24	0	0	0	0	0	0
Malta	350	0	0	0	0	157.4	25e	25e	0	0	0	0	0	0
Portugal	10,088	95	8	720	1,020	106.7	506	488	451	425	583	595	952	1,042
Spain	38,249	197	30	3,113	1,592	160.1	2,807	2,778	1,450	1,383	2,684	2,754	1,380	1,412
Switzerland	6,437	29	5	1,050	325	360.7	1,003	1,053	496	540	889	918	292	284
Other W. Europe	**62,910**	**356**	**61**	**6,945**	**4,159**	**182.1**	**5,181**	**5,199**	**3,554**	**3,518**	**5,863**	**6,056**	**3,783**	**3,907**
Total W. Europe	**350,674**	**1,462**	**305**	**50,820**	**30,889**	**263.7**	**40,938**	**42,390**	**28,050**	**29,435**	**42,701**	**44,349**	**25,074**	**26,910**
Albania	2,750	4	4	10e	10e	10.4	13e	13e	8e	8e	8e	8e	8e	8e
Bulgaria	8,949	20	–	520	280	114.9	462	466	334	351	354	359	212	203
Czechoslovakia	15,000	49	24	1,331	1,031	167.5	1,182	1,182	976	984	1,249	1,258	960	977
German Dem. Rep.	16,702	21	19	–	–	178.4	1,355	1,352	801	803	1,261	1,244	678	674
Hungary	10,700	10	6	–	–	133.8	643	649	287	311	462	478	105	103
Poland	36,700	52	21	1,373	1,030	74.5	1,267	1,240	973	996	1,173	1,221	813	871
Romania	22,000	20	12	870e	970e	68.6	684e	685e	939e	959e	805e	806e	815e	845e
USSR	273,800	84	57	10,500	9,500	77.2	8,828	9,446e	6,770	7,233e	8,978	9,556e	7,444	7,913e
Yugoslavia	22,896	30	21	1,425	825	110.2	1,160	1,172	951	884	1,190	1,229	749	767
E. Europe	**409,497**	**290**	**164**	**16,029**	**13,646**	**87.3**	**15,594**	**16,205**	**12,039**	**12,529**	**15,480**	**16,159**	**11,784**	**12,381**
Total Europe	**760,171**	**1,752**	**469**	**66,849**	**44,535**	**168.7**	**56,532**	**58,595**	**40,089**	**41,974**	**58,181**	**60,508**	**36,858**	**39,271**
NORTH AMERICA														
Canada	24,900	107	34	15,397	23,418	415.3	4,292	4,691	11,331	12,579	12,408	13,353	17,007	19,221
United States	234,000	581	195*	64,242	50,986	588.6	57,808	63,216	44,993	48,068	53,965	58,849	44,755	47,661
North America	**258,900**	**688**	**229**	**79,639**	**74,404**	**571.9**	**62,100**	**67,907**	**56,324**	**60,647**	**66,373**	**72,202**	**61,762**	**66,882**
ASIA														
Afghanistan	16,000	0	0	0	0	0.2	1e	1e	0	0	0	0	0	0
Bangladesh	91,000	7	8	165	150	2.2	83	95e	97	97e	73	79e	87	87e
Bahrain	400	0	0	0	0	11.0	2e	2e	0	0	0	0	0	0
Bhutan	1,400	0	0	0	0	1.5	1e	1e	0	0	0	0	0	0
Brunei	300	0	0	0	0	14.8	2e	2e	0	0	0	0	0	0
Burma	33,700	4	2	–	–	2.6	40e	40e	17e	17e	10e	10e	17e	17e
China, People's Rep.	1,024,950	1,600e	–	7,280	6,190	15.0	6,222	6,931	4,917	5,456	5,890	6,613	4,439	4,725
Cyprus	700	0	0	0	0	119.7	46	38e	0	0	0	0	0	0
Hong Kong	5,200	3	0	30	0	262.8	620	620e	5	5	20	20e	0	0
India	683,000	222	303	2,165	56	4.9	1,520	1,517	900e	900e	1,250	1,337	850e	850e
Indonesia	150,000	34	15	676	–	9.3	629	626	352	167	332	377	153	167
Iran	40,000	17	8	330	260	25.1	550	454e	180	140e	139	104e	100	80e
Iraq	13,000	2	2	144	90	19.8	70	70e	50	50e	30	30e	30	30e
Israel	4,213	8	0	155	0	177.5	330	339	68	72	133	139	0	0
Japan	119,453	593	65	23,198	12,459	337.3	17,345	18,389	10,313	10,986	17,453	18,442	8,627	8,860
Jordan	3,000	1	2	12	-	8.8	11	12	0	0	15	12	-	-
Kampuchea	9,000	0	0	0	0	1.8	7	7e	0	0	0	0	0	0
Korea, People's Rep.	20,000	6	2	100	80	9.9	90	90	50	50	80	80	50	50
Korea, Rep. of	39,331	170	5	2,180	314	108.5	1,660	1,935	671	754	1,737	1,982	235	242
Kuwait	1,400	1	0	24	0	141.8	75	90	5	10	5	20	0	0
Laos	3,800	0	0	0	0	0.7	1	1e	0	0	0	0	0	0
Lebanon	3,300	3	0	20e	0	56.9	90	85e	10	10	10	5	0	0
Macao	300	0	0	0	0	80.9	11	11	0	0	0	0	0	0
Malaysia	11,427	13	-	-	-	59.5	318	335e	4	4e	50	60e	-	-
Mongolia	1,750	1	1	10	-	16.3	13	13e	5	5e	5	5e	5	5e
Nepal	14,700	2	1	5e	15e	2.0	13	13e	8	8e	3	3e	8	8e
Oman	1,000	0	0	0	0	11.0	5	5e	0	0	0	0	0	0
Pakistan	87,524	20	18	140	115	4.4	225	259	109	126	119	133	95	110
Philippines	52,000	20	8	515	303	18.1	366	427	162	210	233	292	127	145
Qatar	300	0	0	0	0	22.0	3	3e	0	0	0	0	0	0
Saudi Arabia	9,400	0	0	0	0	25.6	106	110e	0	0	0	0	0	0
Singapore	2,500	2	0	40e	0	211.6	248	240e	3	3e	15	15e	0	0
Sri Lanka	14,800	2	2	38	26	10.8	67	72e	28	28e	22	27e	21	21e
Syria	9,000	3	0	65	0	17.0	69	69	0	0	10	10e	0	0
Taiwan	18,775	157	2	1,960	400	202.8	1,487	1,704	354	416	1,557	1,720	293	300*
Thailand	50,000	33	5	446	110	22.7	491	517	128	130e	351	360e	41	50e
Turkey	48,000	35	16	637	548	26.7	588	581e	371	238e	531	568e	350	180e
United Arab Emirates	1,000	0	0	0	0	13.2	6	6e	0	0	0	0	0	0
Vietnam	53,000	55e	50e	100e	90e	3.7	68e	88e	85e	95e	63e	83e	35e	40e
Yemen Arab Rep.	5,500	0	0	0	0	0.9	2	2e	0	0	0	0	0	0
Yemen Dem. Rep.	2,000	0	0	0	0	2.2	2	2e	0	0	0	0	0	0
*Market pulp only.														
Asia	**2,646,123**	**3,014**	**515**	**40,435**	**21,206**	**28.0**	**33,483**	**35,802**	**18,892**	**19,977**	**30,138**	**32,526**	**15,563**	**15,967**

e = Estimate.

Note: The per capita figure is for consumption of paper and board in 1983. Some national editors have taken other factors into consideration, such as inventory; hence, production plus imports less exports is not always the same amount as noted above.

INDUSTRY AT A GLANCE

	Population (000)	Number of mills P&B	Number of mills Pulp	CAPACITY (000 m tons) P&B	CAPACITY (000 m tons) Pulp	Per capita (lb)	CONSUMPTION (000 m tons) P&B 1982	CONSUMPTION (000 m tons) P&B 1983	CONSUMPTION (000 m tons) Pulp 1982	CONSUMPTION (000 m tons) Pulp 1983	PRODUCTION (000 m tons) P&B 1982	PRODUCTION (000 m tons) P&B 1983	PRODUCTION (000 m tons) Pulp 1982	PRODUCTION (000 m tons) Pulp 1983
AUSTRALASIA														
Australia	15,371	16	18	1,750	1,155	280.0	2,049	2,025	947	828	1,496	1,451	705	618
Fiji	700	0	0	0	0	31.5	10e	10e	0	0	0	0	0	0
New Zealand	3,190	6	6	797	1,312	324.1	488	419	615	611	702	669	1,040	1,073
Papua New Guinea	3,700	0	0	0	0	3.5	6e	6e	0	0	0	0	0	0
Samoa	200	0	0	0	0	11.0	1e	1e	0	0	0	0	0	0
Australasia	**23,161**	**22**	**24**	**2,547**	**2,467**	**232.1**	**2,554**	**2,461**	**1,562**	**1,439**	**2,198**	**2,120**	**1,745**	**1,691**
LATIN AMERICA														
Argentina	29,000	91	18	1,020	670	70.5	918	929	504	637	838	883	390	618
Bahamas	210	0	0	0	0	10.6	1	1e	0	0	0	0	0	0
Barbados	280	0	0	0	0	55.1	7	7e	0	0	0	0	0	0
Belize	150	0	0	0	0	29.3	3	2e	0	0	0	0	0	0
Bolivia	5,600	2	0	-	0	39.0e	99e	99e	48e	48e	59e	59e	26e	26e
Brazil	126,480	160	48	-	-	57.1	3,312	3,271	2,136	1,919	3,314	3,420	2,898	2,917
Chile	11,682	18	7	433	851	50.5	222	267	190	276	262	325	667	796
Colombia	28,000	26	6	530	250	35.5	460	451e	233	235e	366	365e	194	189e
Costa Rica	2,435	2	1	18	25	112.2	124	124	13	16	13	13	7	10
Cuba	10,000	9	3	150	60	51.1	232	232e	80	80e	73	73e	32	32e
Dominican Rep	5,551	2	0	45e	0	25.8	65	65e	4	4e	9	9e	0	0
Ecuador	8,500	9	5	62	32	25.6	99	99	48	48	59	59	26	26
El Salvador	5,500	3	0	40	0	20.9	52	52e	3	5	22	23	0	0
Guatemala	7,500	4	0	50	0	28.0	88	95e	5	10e	43	40e	0	0
Guyana	900	0	0	0	0	17.2	7	7e	0	0	0	0	0	0
Haiti	5,800	0	0	0	0	2.2	6	6e	0	0	0	0	0	0
Honduras	4,000	0	0	0	0	38.6	65	70e	0	0	0	0	0	0
Jamaica	2,226	1	0	18e	0	22.7	22	23	0	0	9	8	0	0
Mexico	77,000	66	23	2,967	1,078	63.3	2,268	2,208	876	913	1,967	2,062	748	759
Neth. Antilles	247	0	0	0	0	26.7	3	3e	0	0	0	0	0	0
Nicaragua	2,000	0	0	0	0	22.0	25	20e	0	0	0	0	0	0
Panama	2,100	3	0	20	0	84.0	80	80	0	0	21	23	0	0
Paraguay	3,117	3	0	0	0	18.3	26	26e	15	15	13	13	15	15
Peru	19,000	15	4	427	311	20.5	197	176	110	81	145	131	75	60
Surinam	355	0	0	0	0	93.3	15	15e	0	0	0	0	0	0
Trinidad/Tobago	1,200	0	0	0	0	56.9	31	31e	0	0	0	0	0	0
Uruguay	2,900	12	5	60	28	37.3	47	49	28	32	43	47	21	28
Venezuela	16,800	12	3	650	160	102.3	779	779	233	233	539	539	63	63
Latin America	**378,533**	**438**	**123**	**6,490**	**3,465**	**53.6**	**9,253**	**9,187**	**4,526**	**4,552**	**7,815**	**8,092**	**5,162**	**5,539**
AFRICA														
Algeria	20,000	6	3	34	24	15.0	133	135	92	91	87	90	31	31
Angola	7,200	2	1	30e	45e	8.6	28e	28e	25e	25e	15e	15e	35e	35e
Benin	3,670	0	0	0	0	1.8	3e	3e	0	0	0	0	0	0
Botswana	850	0	0	0	0	2.6	1e	1e	0	0	0	0	0	0
Burundi	4,590	0	0	0	0	2.0	4e	4e	0	0	0	0	0	0
Cameroon	8,600	0	1	0	120	6.4	25e	25e	0	0	0	0	90e	90e
Central African Rep	2,340	0	0	0	0	0.9	1e	1e	0	0	0	0	0	0
Chad	4,590	0	0	0	0	0.9	2e	2e	0	0	0	0	0	0
Congo	1,580	0	0	0	0	1.3	1e	1e	0	0	0	0	0	0
Egypt	45,000	15	3	170	60	14.3	270	292	75	78	133	136	46	47
Ethiopia	33,000	2	0	8	0	1.1	15e	15e	5	5e	5	5e	0	0
Gabon	610	0	0	0	0	7.3	2e	2e	0	0	0	0	0	0
Gambia	610	0	0	0	0	7.3	2e	2e	0	0	0	0	0	0
Ghana	15,000	0	0	0	0	0.4	3e	3e	0	0	0	0	0	0
Guinea	5,410	0	0	0	0	1.5	4e	4e	0	0	0	0	0	0
Ivory Coast	8,160	0	0	0	0	9.5	35	35e	0	0	0	0	0	0
Kenya	17,000	4	2	80	60	8.4	55	65e	53	55e	60	67e	53	52e
Lesotho	1,380	0	0	0	0	1.5	1e	1e	0	0	0	0	0	0
Liberia	1,910	0	0	0	0	1.1	1e	1e	0	0	0	0	0	0
Libya	3,000	2	0	10	0	15.4	21e	21e	6	6e	6	6e	0	0
Madagascar	9,500	1	2	28	11	3.7	14	16	10	11	12	14	6	7
Malawi	6,120	0	0	0	0	4.4	12e	12e	0	0	0	0	0	0
Mali	7,040	0	0	0	0	0.2	1e	1e	0	0	0	0	0	0
Mauritania	1,680	0	0	0	0	5.3	4e	4e	0	0	0	0	0	0
Mauritius	1,020	0	0	0	0	15.2	7e	7e	0	0	0	0	0	0
Morocco	21,500	8	1	120	100	19.8	174	182	41	55	104	108	69	86
Mozambique	10,500	2	0	10	0	4.6	23e	23e	3	3e	3	3e	0	0
Niger	5,460	0	0	0	0	0.4	1e	1e	0	0	0	0	0	0
Nigeria	85,000	3	3	14	-	4.4	110	252	0	35	0	12	0	24
Rwanda	5,100	0	0	0	0	0.9	2e	2e	0	0	0	0	0	0
Senegal	5,770	0	0	0	0	6.4	17e	17e	0	0	0	0	0	0
Sierra Leone	3,570	0	0	0	0	1.3	2e	2e	0	0	0	0	0	0
Somalia	3,770	0	0	0	0	1.1	2e	2e	0	0	0	0	0	0
South Africa	24,000	16	10	1,460	1,190	118.6	1,325	1,292	989e	985e	1,295	1,255	1,165e	1,165e
Sudan	21,595	4	0	10	0	4.4	13	20e	0	0	3	10	0	0
Swaziland	700	0	1	0	180	3.1	1	1	1	-	0	0	170	175
Tanzania	17,750	1	0	4	0	3.5	28	28e	3	3e	3	3e	0	0
Togo	2,650	0	0	0	0	5.1	6e	6e	0	0	0	0	0	0
Tunisia	6,500	5	1	35	25	27.6	77	81	9	10	29	33	18	20
Uganda	13,500	1	0	5	0	1.3	8	8e	3	3	3e	3e	0	0
Upper Volta	7,040	0	0	0	0	0.2	1e	1e	0	0	0	0	0	0
Zaire	28,350	1	0	3	0	0.7	9e	9e	1e	1e	1	1	0	0
Zambia	6,250	1	2	16	14e	11.2	32e	32e	12	15	12	12e	7e	10e
Zimbabwe	7,500	3	2	75	35e	23.6	80e	80e	55e	55e	55e	55e	30e	30e
Africa	**486,365**	**77**	**32**	**2,112**	**1,864**	**12.3**	**2,556**	**2,720**	**1,383**	**1,431**	**1,826**	**1,828**	**1,720**	**1,772**
WORLD TOTAL	**4,553,253**	**5,991**	**1,392**	**198,072**	**147,941**	**85.5**	**166,478**	**176,672**	**122,776**	**130,010**	**166,529**	**177,276**	**122,810**	**131,122**

COPYRIGHT 1984 BY MILLER FREEMAN PUBLICATIONS INC. NOT TO BE REPRODUCED WITHOUT PERMISSION.

was also up, by 10.5% at 1.72 million tons, despite lost output from the temporary closure of two major companies.

Paper/board output in **India** increased by 7% to 1.34 million tons. Two new newsprint mills started up during the year and more are under construction. India also saw a sharp increase in the number of small mills (from 2 to 30 tpd) using imported second-hand machines. The bigger mills were hit by power failures and shortages of raw materials and spare parts. Similar problems affect the smaller neighboring producers in **Pakistan** and **Bangladesh**.

People's Rep. of China had another major rise in paper and board production in 1983, up 12.3% to 6.61 million tons, while imports dropped 2% to 518,000 tons. A machine modernization program is becoming widespread, as shown by new rebuild agreements with major foreign suppliers and by the 420,000-tpy rise in paper and board production capacity in 1983.

Of new mill projects, **Malaysia** is now going ahead with two big new integrated printing/writing mills, and there are tentative plans for a new mill in **Thailand**. In **Indonesia**, a major kraft paper and board project is now in doubt following the withdrawal of Georgia-Pacific. Government control of paper dumping helped mills in the **Philippines** to increase output, but the difficulty of importing raw materials and poor industry profitability make the 1984 outlook uncertain.

Australasia output falls. Paper and board output in 1983 for both **Australia** and **New Zealand** fell below 1982 levels. While both enjoyed the beginnings of recovery by end-1983, it came too late to boost output, and industry profitability was down in Australia particularly. An 8% drop in Australian output of packaging and industrial grades—one result of a bad drought—was largely responsible for the total fall of 3% to 1.45 million tons.

TOP 26 PRODUCING NATIONS *(Continued)*

New Zealand

Population: 3,190,000. Per capita consumption of paper and board: 147 kg/ 324 lb. Paper and board mills: 6. Pulp mills: 6 (sulfate: 2; semichemical: 2; mechanical: 5)

Paper/board capacity: 797,091 tons **Pulp capacity:** 1,312,170 tons
Operating rate 1983: 84% **Operating rate 1983:** 82%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	476	410	47	37	222	228
Board	226	259	—	—	38	59
Total	**702**	**669**	**47**	**37**	**260**	**287**
Chemical woodpulp	557	604	14	7	227	219
Other pulps	483	469	2	1	214	251
Total	**1,040**	**1,073**	**16**	**8**	**441**	**470**

Norway

Population: 4,130,000. Per capita consumption of paper and board: 130 kg/ 287 lb. Paper and board mills: 23. Pulp mills: 27 (sulfate: 2; sulfite: 4; semichemical: 2; mechanical: 19)

Paper/board capacity: 1,785,000 tons **Pulp capacity:** 2,170,000 tons
Operating rate 1983: 77% **Operating rate 1983:** 75%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	1,170	1,234	110	120	898	961
Board	134	134	97	96	90	96
Total	**1,304**	**1,368**	**207**	**216**	**988**	**1,057**
Chemical woodpulp	642	715	219	131	333	378
Other pulps	992	1,060	6	11	271	295
Total	**1,522**	**1,640**	**222**	**138**	**495**	**535**

Poland

Population: 36,700,000. Per capita consumption of paper and board: 34 kg/ 75 lb. Paper and board mills: 52. Pulp mills: 21 (sulfate: 6; sulfite: 2; semichemical: 2; mechanical: 8; nonwood: 3)

Paper/board capacity: 1,373,000 tons **Pulp capacity:** 1,030,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	765	813	70	73	16	29
Board	408	408	56	27	16	52
Total	**1,173**	**1,221**	**126**	**100**	**32**	**81**
Chemical woodpulp	618	678	130	112	4	32
Other pulps	195	193	34	45	—	—
Total	**813**	**871**	**164**	**157**	**4**	**32**

Portugal

Population: 10,088,200. Per capita consumption of paper and board: 48 kg/ 106 lb. Paper and board mills: 95. Pulp mills: 8 (sulfate: 5; sulfite: 2; soda: 1)

Paper/board capacity: 720,000 tons **Pulp capacity:** 1,020,000 tons
Operating rate 1983: 83% **Operating rate 1983:** 102%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	370	408	47	50	21	41
Board	218	187	34	23	137	139
Total	**558**	**595**	**81**	**73**	**158**	**180**
Chemical woodpulp	909	1,010	13	18	521	641
Other pulps	43	32	7	6	—	—
Total	**952**	**1,042**	**20**	**24**	**521**	**641**

Romania

Population: 22,000,000. Per capita consumption of paper and board: 31 kg/ 68 lb. Paper and board mills: 20. Pulp mills: 12 (sulfate: 7; sulfite: 3; semichemical: 1; mechanical: 1; nonwood: 4)

Paper/board capacity: 870,000e tons **Pulp capacity:** 970,000e tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	255	256	n.a.	n.a.	n.a.	n.a.
Board	550	550	n.a.	n.a.	n.a.	n.a.
Total	**805**	**806**	**46**	**46**	**167**	**167**
Chemical woodpulp	645	675	n.a.	n.a.	n.a.	n.a.
Other pulps	170	170	n.a.	n.a.	n.a.	n.a.
Total	**815**	**845**	**134**	**134**	**10**	**20**

South Africa

Population: 24,000,000. Per capita consumption of paper and board: 54 kg/ 119 lb. Paper and board mills: 16. Pulp mills: 10 (sulfate: 2; sulfite: 1; soda: 1; semichemical: 2; mechanical: 2; nonwood: 2)

Paper/board capacity: 1,460,000 tons **Pulp capacity:** 1,190,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	747	690	158	169	171	147
Board	548	565	79	71	36	54
Total	**1,295**	**1,255**	**237**	**240**	**207**	**201**
Chemical woodpulp	460	460	216	220	30	40
Other pulps	705	705	1	—	363	360
Total	**1,165**	**1,165**	**217**	**220**	**393**	**400**

The pulp and paper industry in New Zealand, where nearly 50% of output is exported, was hit by weak international markets in early 1983. Pulp output ended the year marginally up at 1.07 million tons, while paper and board production was down 4.7% at 669,000 tons. But there was a marked improvement in early 1984 and some companies expected record profits.

LATIN AMERICA

THE ECONOMIC UPSWING in North America and Europe, beginning in the second half of 1983, brought some relief to the pulp and paper industry in Latin America. One major problem that did not go away, however, was the continent's massive foreign debt, estimated to be $160 billion. The 1984 interest payments on existing loans alone was estimated at $22.5 billion.

With inflation in double, and sometimes treble, figures (Argentina's inflation rate was 500% in 1983-84), the trend in Latin America's pulp and paper industry was toward greater self-sufficiency, especially in pulp and newsprint, to ease the crippling import bill for these commodities.

Latin American countries tried to join together to solve their common debt problems, and the major nations' finance ministers frequently met. One example of cooperation was when **Brazil, Colombia, Venezuela** and **Mexico** helped **Argentina** to pay $300 million of a $500-million overdue interest payment package.

The debt repayment issue was the subject of talks between Latin American debtor nations (most of whose debt is owed to U.S. banks) and the International Monetary Fund (IMF) in Washington. The IMF's insistence on strict domestic austerity programs, as a prerequisite for continuing aid, was unacceptable to many of the debtor nations. The point was made frequently in 1983 that every time the U.S. prime interest rate rose 1%, it added about another $1.5 billion/year to Latin America's debt bill. Several debtor nations demanded that the IMF establish a special aid fund linked to rising interest rates in the U.S.

Output up in 1983. Total Latin American paper and board output rose 3.5% in 1983 to just over 8 million tons. Inline with the continent's overall plan of cutting imports and boosting exports, paper and board imports fell 7.9% to 1.67 million tons, while exports rose a massive 48.8% (mainly from **Brazil** and **Chile**), to just under 600,000 tons. Much of the increase was traded internally among Latin American countries.

Total pulp production in Latin America last year rose 7.7% to 5.538 million tons. Pulp imports fell 5.4% to 577,000 tons, and exports were up 25.5% to 1.57 million tons. In **Argentina**, the new Alto Paraná mill helped raise pulp exports by 38,000 tons in its first year of production. The mill expects to export 40%, or almost 70,000 tpy, of its output at full capacity in 1984-85.

Pulp exports from **Chile** rose 9% to 520,000 tons, while **Brazil**'s exports were up 30% at 1.011 million tons, breaking the million-ton barrier for the first time. Of **Brazil**'s market pulp, 19% went to Japan in 1983, followed by 17% to the U.S. and 13% to Fed. Rep Germany, its third largest market.

Last year saw the completion of a number of pulp and paper projects. Papel del Tucuman started up its 105,000-tpy bagasse-based newsprint mill at San Miguel, **Argentina**. In **Mexico**, San Cristóbal started up a new 50,000-tpy tissue machine at its Ecatepec mill.

Several major projects are scheduled for startup in Latin America in 1984. They include: Celulosa Argentina's 140,000-tpy kraft paper and corrugating medium mill and an adjacent 170,000-tpy unbleached kraft pulp mill in **Argentina**; Pisa's 110,000-tpy newsprint machine in Brazil, as well as a 100,000-tpy TMP pulp line; Suzano's 140,000-tpy folding boxboard machine in **Brazil**; Papeles Sudamericana's integrated 100,000-tpy packaging paper mill in Chile; Papelcol's 80,000-tpy integrated printing and writing paper mill in **Colombia**; and the El Rancho pulp mill in **Guatemala**, scheduled to make 100,000 tpy of bleached and semibleached kraft pulp beginning at the end of 1984.

Although some large-scale pulp and paper projects were announced in various countries for late-1980s startup, the continuing debt crises were almost certain to cause postponements, according to observers.

AFRICA

FOR THE THIRD YEAR in a row, African paper and board production stayed at virtually the same level. It totaled 1.83 million tons in 1983, just 2,000 tons higher than 1982 and marginally below the 1981 total of 1.84 million tons.

The trend in African production shows steady growth through the late 1970s from 1.42 million tons in 1977, followed by almost zero growth in the early 1980s. But another growth period, probably the biggest in the continent's history, is about to begin as the major pulp and paper expansions in South Africa start running.

Paper and board output in **South Africa**, totaling over twice as much as the rest of African production put together, usually determines whether the continent has a good or bad year. However, in 1983 it was the output of the other nations that produced the continent's total increase (though small) over 1982, because South African production alone dropped 3% to 1.26 million tons.

A 35% drop in newsprint production was the main reason for the decline. However, paper stocks at South African mills also dropped over the year, by about 22% to 100,000 tons, and newsprint stocks dropped most of all, by about 50,000 tons to 30,000 tons by end-1983. A strong U.S. dollar, low gold price and a very severe drought all affected the South African economy with a consequent effect on paper and board demand. Alleged dumping of paper from the U.S. and weak international pulp and paper prices also took their toll.

Major growth period. But the South African capacity and thus total African capacity is going through its biggest growth period ever. The new pulp, newsprint and, particularly, linerboard production lines from Sappi's

Ngodwana and Mondi's Richards Bay mills should be running by end-1985. The increase in output should become fully effective in 1987, provided of course that ready buyers (mainly in Europe and the Far East) for the increased export tonnage can be found.

Other expansion projects in Africa are also progressing, though realistic startup dates are difficult to determine. However, several are now nearing completion.

In **Nigeria**, there is at last some hope that money may be provided by the new government to start up two of the three new mills. These have been built, and one even held a short trial run on one machine in 1983, but they lack funds for power and raw materials for startup.

In **Egypt**, two extensive mill modernizations are now under way, and tenders are being sought for a greenfield integrated bagasse/printing and writing grade mill. The Southern Paper Mills' project at Mufindi in **Tanzania** to make printing/writing grades and kraft paper and board received further finance for personnel training and should be nearing startup.

The government of **Sudan** is looking at possible sites for a bagasse-printing/writing grades mill, and the nation's fourth paper company began operating in early 1984. In **Kenya**, the country's first mechanical pulp mill is starting up in mid-1984, and a small new newsprint mill is being planned. In **Morocco**, three new investments are due for completion over 1984-85, including a pulp line rebuild at Cellulose du Maroc, adding 20,000 tpy capacity.

Prospects for Africa's pulp/paper industry are brighter than they seemed in 1982 and early 1983. There is guarded optimism about recovery in 1984, and capacity should significantly grow over the next few years, reducing the heavy dependence on imports. ■

TOP 26 PRODUCING NATIONS *(Continued)*

Spain

Population: 38,249,000. Per capita consumption of paper and board: 73 kg/161 lb. Paper and board mills: 197. Pulp mills: 30 (sulfate: 13; sulfite: 1; semichemical: 1; mechanical: 10; nonwood: 5)

Paper/board capacity: 3,113,000* tons **Pulp capacity:** 1,592,000 tons
Operating rate 1983: 85% **Operating rate 1983:** 86%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	1,429	1,494	342	295	197	200
Board	1,254	1,260	119	117	140	188
Total	**2,683**	**2,754**	**461**	**412**	**337**	**388**
Chemical woodpulp	1,010	1,057	259	257	151	264
Other pulps (includes semichemical)	350	355	1	4	18	26
Total	**1,360**	**1,412**	**260**	**261**	**169**	**290**

* Calculated on working 330 days/year.

Sweden

Population: 8,330,000. Per capita consumption of paper and board: 212 kg/467 lb. Paper and board mills: 56. Pulp mills: 57 (sulfate: 25, sulfite: 9; semichemical: 2; mechanical: 21)

Paper/board capacity: 7,135,000 tons **Pulp capacity:** 9,443,000 tons
Operating rate 1983: 89% **Operating rate 1983:** 92%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	3,561	3,793	119	147	2,545	2,728
Board	2,357	2,557	65	67	1,882	1,978
Total	**5,918**	**6,350**	**184**	**214**	**4,427**	**4,706**
Chemical woodpulp	5,867	6,628	74	85	2,107	2,644
Other pulps	1,839	2,040	18	25	368	435
Total	**7,706**	**8,668**	**92**	**110**	**2,475**	**3,079**

Taiwan

Population: 18,775,000. Per capita consumption of paper and board: 92 kg/204 lb. Paper and board mills: 175. Market pulp mills: 2 (sulfate: 1; nonwood: 1)

Paper/board capacity: 1,960,000 tons **Pulp capacity:** 400,000 tons
Operating rate 1983: 88% **Operating rate 1983:** 75%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	514	537	85	94	41	27
Board	1,042	1,183	13	13	127	96
Total	**1,556**	**1,720**	**98**	**107**	**168**	**123**
Chemical woodpulp	207	216	128	173	59	58
Other pulps	86	84	4	7	13	6
Total	**293**	**300**	**132**	**180**	**72**	**64**

U.S.S.R.

Population: 273,800,000. Per capita consumption of paper and board: 35 kg/77 lb. Paper and board mills: 84. Pulp mills: 57.

Paper/board capacity: 10,500,000 tons **Pulp capacity:** 9,500,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	5,439	5,667	690	740	730	731
Board	3,539	3,889	270	270	380	380
Total	**8,978**	**9,556**	**960**	**1,010**	**1,110**	**1,111**
Chemical woodpulp	5,881	6,251	271	271	955	955
Other pulps	1,563	1,662	—	—	—	—
Total	**7,444**	**7,913**	**271**	**271**	**955**	**955**

United Kingdom

Population: 55,950,000. Per capita consumption of paper and board: 126 kg/278 lb. Paper and board mills: 102. Pulp mills: 3 (semichemical: 2; mechanical: 1)

Paper/board capacity: 3,497,000 tons **Pulp capacity:** 196,000 tons
Operating rate 1983: 92% **Operating rate 1983:** 88%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	1,503	1,464	2,590	2,728	162	179
Board/other paper	1,695	1,745	1,361	1,557	237	245
Total	**3,198**	**3,209**	**3,951**	**4,285**	**399**	**424**
Chemical woodpulp	80	—	1,219	1,339	—	1
Other pulps	61	—	131	144	2	—
Total	**141**	**173**	**1,350**	**1,483**	**2**	**1**

United States

Population: 234,000,000. Per capita consumption of paper and board: 267 kg/589 lb. Paper and board mills: 581 (1982). Pulp mills: 195 (sulfate: 120; sulfite: 20; semichemical: 41; mechanical: 47)

Paper/board capacity: 64,242,000* tons **Pulp capacity:** 50,986,000* tons
Operating rate 1983: 92% **Operating rate 1983:** 94%

(000 metric tons)

	Production		Imports		Exports	
	1982	1983	1982	1983	1982	1983
Paper	27,599	29,863	7,033	7,787	781	721
Board	26,366	28,986	105	152	2,514	2,851
Total	**53,965**	**58,849**	**7,138**	**7,939**	**3,295**	**3,572**
Chemical woodpulp	40,161	43,064	3,186	3,546	3,075	3,300
Other pulps	5,585	5,741	300	341	579	593
Total	**44,755**	**47,661**	**3,317**	**3,713**	**3,080**	**3,306**

* Capacity data exclude 1,141,000 tons of construction paper capacity and 1,354,000 tons of woodpulp for construction paper and board.

READER SALARY SURVEY

This issue contains a postage-paid survey form that readers can fill out and mail in; survey results will be published in our December 1984 issue

Tell us about your salary and benefits

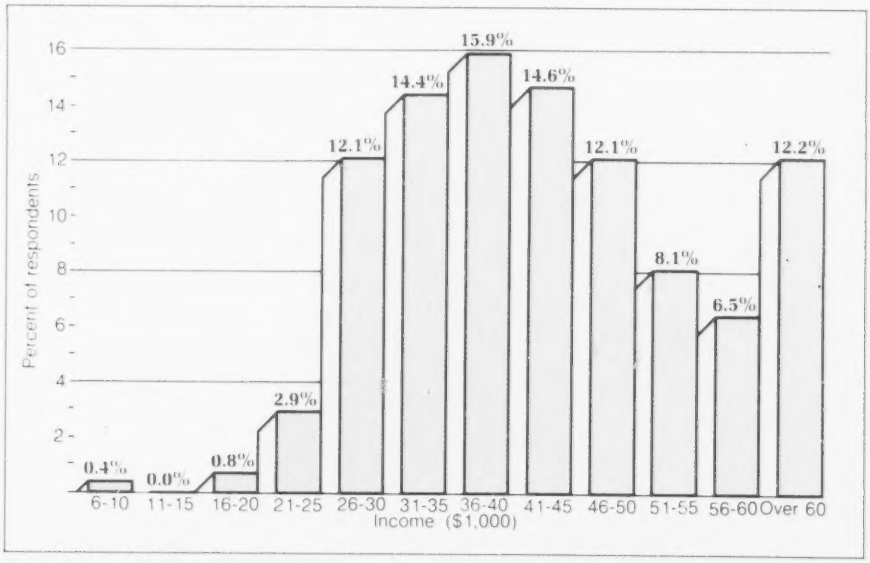
By KENNETH E. SMITH, Executive Editor

■ The December 1983 issue of *Pulp & Paper* reported the results of our first reader salary and opinion survey. The survey is being repeated again this year, and this issue contains a postage-paid (for U.S. residents), tear-out survey form beginning on page 81 that our readers can use to tell us about their salaries and benefits as well as express opinions on any subject. We hope that each of you will take just a few minutes to complete the form and mail it back to us no later than *October 19, 1984*.

Judging by the response to last year's survey, we know that the information gathered by this type of survey is of great interest to our readers. Obviously, the more people who participate in the survey, the more meaningful are the final survey data and conclusions. In addition to questions about compensation, the form contains space for reader comments. We would appreciate your comments on any subject from salary and benefits to suggestions on how we can improve *P&P* itself. We do listen to our readers, and especially interesting comments will be published. All completed survey forms will be turned over to an independent consultant for data processing as received, and the results will be published in our December 1984 issue.

In addition to the tear-out form, we have printed the questionnaire a second time in this issue (page 78) to be used as a permanent record for survey respondents.

FIGURE 1:
Income distribution of 1983 survey respondents.



Also, our "pass-along" readers who may receive the magazine after the survey form has been removed can still photocopy and complete the survey form and mail it in. The survey is strictly confidential, and respondents should not sign it or otherwise identify themselves.

Only 3.6% of last year's respondents were Canadians. Unfortunately, we cannot include a postage-paid envelope for Canadian residents due to postal regulations. However, we want to hear more from north of the border this year and hope that our Canadian readers will let us know how they've fared in 1984.

BENEFITS OF ECONOMIC RECOVERY. 1983 was a year of recovery for the U.S. pulp and paper industry, and the results of our 1983 survey clearly reflected this recovery as well as the residual effects of the deepest recession since the Great Depression. More than 88% of the survey respondents reported that they were happy in their jobs and that their overall job morale was good. More than 83% said they would stay in the industry if they changed jobs. The median salary of all our respondents was $42,000. The last pay increase received by respondents averaged 8%, and additional salary and benefits received averaged between $5,000 and $10,000. These figures compared favorably with salary data published in recent years by the Engineering Manpower Commission for engineers in the paper industry.

However, survey respondents also reported an average of only two salary increases in the past three years while noting that normally their salaries are reviewed on an annual basis. Obviously, this data indicates that salary freezes were in effect for many survey respondents during the last recession. In fact, many respondents commented they had received little or no increase in salary in recent years, although they had taken on additional responsibilities due to staffing cuts, while union employees at the same companies had continued to receive larger increases according to union contract. Other reader concerns included the problems of salary compression and discrimination against older employees and the need for more women in management positions.

As this issue goes to press, 1984 promises to be a record production and profit year for most pulp and paper companies. We hope this year's survey will show that industry professionals have shared in the current success through increased salaries and improved benefits.

SURVEY FOR ALL PROFESSIONALS. The editors of *P&P* recognize that all professionals within the industry are not engineers. Some have "come up through the ranks" or have degrees in fields other than engineering. In fact, more than 25% of the 1983 survey respondents had bachelor's degrees in disciplines other than engineering. An associate's degree or high school diploma was the highest level of education for another 11%. To our knowledge, no one else has surveyed all managers in the industry on salary and benefits. Therefore, our survey contains questions specifically for industry managers. We want to know how the level of supervisory responsibility and experience affects salary and benefits. Other questions the survey is designed to answer are:

- What jobs in the industry pay the most?
- Which degrees and fields of education lead to the highest salaries?
- Does "job hopping" lead to higher salaries in the long term?
- Does the area you live in affect your salary and benefits?
- Do consultants make more money and have better benefits than managers within the industry?
- Has the value of your benefits kept pace with salary levels and inflation?
- Are you happy in the industry, and if you changed jobs would you remain in the industry?

The editors hope that by addressing issues that concern our readers we can continue to make *P&P* the most useful and well read magazine serving the industry. You can help us to help you by taking time now to complete the survey form as thoroughly as possible. *Please remember we need your response by October 19, 1984!* ■

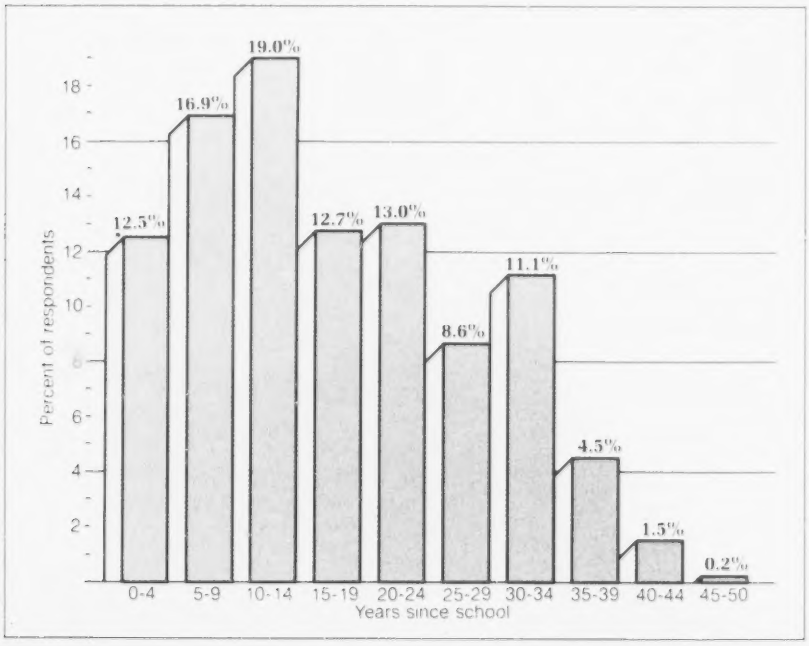
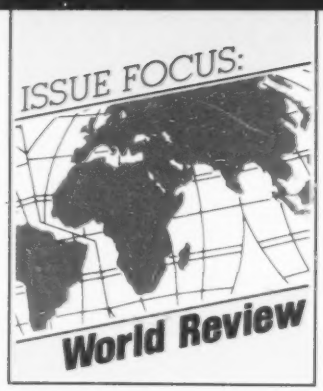


FIGURE 2:
Years of experience distribution of 1983 respondents.



World pulp markets strengthen in U.S., still slow in Europe, Japan

Substantial new market pulp capacity must be absorbed by a healthy world market; potential major capacity expansion seen for eucalyptus

By JOHN C.W. EVANS, Senior Editor

■ World pulp markets, excluding the U.S., experienced only a modest increase in demand during 1983. A major negative factor was the slow rate of economic recovery in western European countries, which consume about one-half of the world's exported pulp. U.S. demand for market pulp was strong during much of 1983, and continues strong in 1984.

The U.S. market was stirred by a several-month-long strike during the first part of 1984 in British Columbia, where about one-half of Canada's market pulp is produced. A new contract was finally approved on June 30.

During 1984-1986, substantial quantities of new market pulp capacity will be starting up, which will require absorption by strong markets. In 1984, four major and two minor market pulp projects will come online, with a total design capacity of some 1.2 million tpy.

The two largest of these projects, both in the U.S., will produce both hardwood and softwood kraft. The two other new large mills are in Europe, one using pine and the second being eucalyptus-based. The two smaller projects will both produce additional hardwood pulp—one in Brazil and the other in the U.S.

In 1985, a modest-sized pine kraft mill will start up in Central America, and a large softwood and hardwood mill will be put into operation in Finland. Exact capacity is unknown for the Finnish mill, but the total capacity for these two mills is probably close to 300,000 tpy.

In 1986, an all-hardwood kraft market pulp mill, with 260,000 tpy of design capacity, will commence operations in the U.S.

The new design capacity, as outlined above, will total more than 1.7 million tpy, of which about 60% is hardwood pulp. To this should be added 130,000 tpy of capacity in Sweden. The figures given here do not include incremental capacity at existing mills, with the exception of the two substantial projects mentioned. Thus, the total added capacity between 1983 and the end of 1986 could be close to 2 million tpy. The U.S. will be the site of nearly one-half of that new capacity.

U.S. PLANS MAJOR PROJECTS. The U.S. has a unique position in the world market pulp picture. It is the largest consumer and the second largest producer/exporter of market pulp. U.S. 1984 capacity for paper-grade market pulp is reportedly 5.7 million tons, according to American Paper Institute's November 1983 Capacity Survey; actual production in 1983 was 5.1 million tons.

U.S. imports of paper-grade market pulp in 1983 were 2.7 million tons; approximately 95% came from Canada. Total U.S. paper-grade pulp imports last year from Canada were around 3.7 million tons—2.7 million market and 1 million "captive" to affiliated mills.

U.S. exports of paper-grade pulp in 1983, at 2.7 million tons, were close to the top figure for its imports of market pulp. An important difference was that the exports included a considerable quantity of bleached hardwood kraft, while little of this grade was imported.

During 1984-85, U.S. market pulp capacity is expected to increase by about 9%, to 6.2 million tpy. This

Market pulp capacity figures

Market pulp capacity figures have one basic weakness: they apply to mills which produce pulp for the market and those which produce pulp for shipment to affiliated (captive) mills. For such pulp mills, the amount of pulp actually available for sale is reduced when paper demand is high.

Market pulp tonnage figures are reported in three different ways: metric air-dried, metric bone-dry, and short air-dried tons. Because the U.S. is still nonmetric, and because the American Paper Institute uses short tons for its capacity figures, this article reports capacity in short air-dried tons throughout.

The subject of this report is paper-grade chemical market pulp. Dissolving pulps and mechanical pulps are not included. Thus, to avoid frequent repetition, when the term "market pulp" is used "paper-grade chemical market pulp" is meant.

←On Reader Service Card **Circle 159**

will rise to about 6.4 million tpy by 1986. These capacity increases are due to two large hardwood/softwood projects scheduled for startup in the fall of 1984, and a large hardwood kraft mill scheduled for 1986. The 1984 projects include the new 1,000-tpd Leaf River mill in Mississippi, and the conversion of International Paper Co.'s, Georgetown, S.C., mill from paperboard to market pulp (850 tpd) and printing papers. In addition, Chesapeake Corp. is increasing its hardwood market pulp capacity by 100 tpd this year.

In 1986, Champion International Corp. will start up its new all-hardwood market pulp mill (750 tpd) in Quinnesec, Mich. It should be noted that all four projects include hardwood kraft. Production of market sulfite pulps is expected to continue declining in the U.S., as is also the case in Nordic countries.

Of the approximately 5.7 million tons of dried papermaking pulps produced in the U.S. during 1983, about one-third was captive, one-third was marketed in the U.S., and one-third was exported.

The state of Maine, a long-time market pulp producer, has been following the pattern of Nordic countries during the last one to two decades. Some paper mills have been expanded, absorbing market pulp capacity at those sites. At others, mill ownership has changed and dried pulp capacity has been converted from market to captive. Some captive/market mills have become integrated, while some older integrated mills have closed their pulping facilities and are dependent entirely upon market or captive pulp. In several cases, producing market pulp mills have been purchased by major pulp and paper companies, with the dried pulp output becoming captive to serve those companies' other mills.

There can be no doubt that the manufacture of pulp for sale in Maine has declined considerably in the past 15 to 20 years, but on the other hand, production of dried pulp for use at affiliated mills has increased substantially more than the drop in market pulp output. Total consumption of dried pulp (market and captive) is now substantially greater than ever before in Maine.

There has been no similar pattern in the Pacific Coast area of the U.S. In the South, some new kraft pulp and paper mills have been built, with the pulp mills having double the requirements of the single paper machines installed. In most of these cases, the excess pulp was dried and sold for several years until a second paper machine was added.

CANADA SLOWS EXPANSION. Canada is the world's largest producer and exporter of chemical paper-grade market pulp, with a 1984 capacity of 7.9 million tpy. Nearly 50% of this capacity, in bleached softwood kraft, is based in British Columbia. Because suitable hardwoods are not available in quantity in this area, hardwood kraft is not produced here.

Three major kraft mill expansions were chiefly responsible for raising annual market pulp capacity by 255,000 tons between 1982 and 1984. These expansions were at Northwood Pulp & Timber Ltd. in Prince George, B.C., Great Lakes Forests Products in Dryden, Ont., and E.B. Eddy Forest Products Ltd. in Espanola, Ont.

Market sulfite pulp capacity will remain steady for 1982 through 1985, according to a recent Canadian Pulp & Paper Assn. survey. It should be noted that Fraser Inc., going against the tide, has modernized and expanded its market sulfite pulp mill at Atholville, N.B. It can now produce 385 tpd of magnesium-based bisulfite pulp.

No major market pulp expansion projects are currently underway or have been announced for Canada. Following the peak for 1984, very modest incremental increases are shown for 1985 and 1986.

More than 90% of Canadian market pulp is produced from northern softwoods, yielding a pulp which obtains a premium price in world markets, as do the softwood pulps from Nordic countries. Canada's position as the leading pulp exporting country is strengthened by the continuing Nordic trend to emphasize production of paper and paperboard in order to obtain a higher return on exports from their limited forest resources.

Since all but a few Canadian paper mills have integrated pulp operations, market pulp shipments to Canadian customers are relatively small, leaving over 90% for export. The U.S. continues to be by far the largest customer for Canadian market pulp, taking approximately one-half the total (plus a substantial quantity of captive pulp for U.S. mills). Japan and Fed. Rep. Germany are, respectively, Canada's second and third largest purchasers of pulp. In terms of offshore regions, western Europe is first and the Far East is second. Relatively small quantities of Canadian pulp are shipped to Latin America or Africa.

The long-term outlook for Canadian market pulp should be excellent, providing costs can be controlled—particularly the demands of Canadian labor unions, notably in British Columbia, where many of the new bleached kraft market pulp mills are located.

The northern grown softwoods provide Canada with a high-quality pulp, similar to that produced in Scandinavia, which commands a premium price. There is a

TABLE 1: **New market pulp mills starting up in 1984 and 1985.**

Mill	Country	Startup	Capacity	Pulp
Leaf River	New Augusta, Miss.	1984	367,000	Bleached hardwood and softwood kraft
Pölser Zellulose & Papierfabrik AG	Austria	1984	140,000	Bleached softwood kraft
Soporcel	Portugal	1984	285,000	Bleached hardwood and softwood kraft
International Paper Co.[1]	Georgetown, S.C.	1984	300,000	Bleached hardwood and softwood kraft
Metsä-Botnia[2]	Aanakoski, Finland	1985	330,000	Bleached hardwood and softwood kraft
Celgusa	El Rancho, Guatemala	1985	110,000	Bleached softwood kraft

1. Mill being converted from paperboard to market pulp.
2. Some of this additional Metsä-Botnia capacity due to its new mill will be captive to its owners.

long-term, built-in preference at many European mills and Far Eastern mills for northern pulp. Canadian producers are in a position to satisfy this preference, and they can only benefit by the reduction in availability of such pulp from Nordic countries (dicussed below).

Canadian kraft mills are moving into bleached hardwood pulps, but much more slowly than several southern U.S. market pulp mills. In fact, the latest Canadian capacity survey indicates a decline in annual hardwood kraft capacity of 90,000 tons between 1984 and 1986, due to a switch to increased softwood kraft production by several companies.

NORDIC DOMESTIC USE UP. Nordic production of market chemical pulp rose from 4.4 million tpy in 1960 to a maximum of 6.8 million tpy in 1973 (a record high), and has steadily declined since then to about 5.5 million tpy for 1980. During the recent recession years, production fell below 5.0 million tpy.

In Finland, there are signs of renewed interest in market pulp, at least partially for domestic consumption. Metsä-Botnia AB, Oy is building a dried bleached kraft (hardwood and softwood) pulp mill at Aanakoski, with a capacity of 330,000 tpy. The new mill is scheduled for startup in 1985. This company, which has a similar plant at Kaskinen, is owned by a consortium of Finnish paper companies. Over one-half the capacity of the two mills (715,000 tpy), is captive to the owners. An estimated 330,000 tpy will be marketed, mainly exported from the older Kaskinen mill, with the output of the new mill directed to the owners' mills (or to the Finnish market). Thus, in this case a Finnish company has more than compensated for increased domestic use by adding a second dried pulp mill. Finland's market pulp capacity (papermaking grades of chemical pulp) is reported to be 1.7 million tpy.

Sweden is reportedly increasing chemical paper-grade market pulp capacity by 130,000 tpy between 1983 and 1986, yielding an annual average increase of about 1.3%.

The overall Nordic pattern of gradual reduction in sales of market paper-grade chemical pulp is completely understandable in view of their desire to move to products of higher value (paper and paperboard). Because of the very limited availability of pulpwood for expansion in Scandinavia, this is not unexpected.

There is strong evidence that market chemimechanical pulps of moderate brightness and moderate strength are being developed to compete with market hardwood kraft pulps in some uses. The key advantage is that yield is in the 85% to 90% range, instead of 40% to 45%. Not only are fibrous raw material costs cut nearly in half, depending partly on whether hardwood or softwood is used, but the capital, maintenance, and staffing costs are much lower for a mechanical pulp mill than for a kraft mill. Evidence to date indicates significant market potential for chemimechanical grades.

TWO PROJECTS IN LATIN AMERICA. Brazil exported close to 1 million tons of market pulp in 1983 (about 135,000 to the U.S. in the past two years). Most of this was bleached hardwood kraft produced principally from plantation-grown eucalyptus, with the balance being largely native gmelina.

Annual production capacity for Brazil in 1983 was 1.68 million tons, with an additional 60,000 tons of eucalyptus pulp capacity being brought onstream by Aracruz during 1984. No other capacity increases of any kind have been announced.

The numerous market pulp projects announced for Brazil five years ago have fallen by the wayside, and it is felt that they are unlikely to be revived in the near future. This is due to Brazil's experience with the volatile nature of the pulp markets (as shown in the recent recession), the high cost of construction, high interest rates, and Brazil's financial difficulties. Nevertheless, Brazil offers a reserve source for pulpwood in market pulp production if and when the major producers in North America and Europe reach fiber source restraints on further capacity additions.

Chile has a 500,000-tpy market pulp capacity, measured in bleached and unbleached pine kraft pulp, almost all of which is exported. The pine is plantation grown, and future plantings, if or when implemented, could provide pulpwood to take care of future domestic requirements and any large capacity expansions.

Manufacturera de Papeles y Cartones SA Cia., of Chile recently announced the beginning of a project to add 35,000 tpy (100 tpd) of bleached pine kraft market pulp capacity at its Laja mill. This will raise the total capacity at Latin America's largest softwood kraft mill. The company announced that capacity may be increased again in the early 1990s when new pine plantations mature.

A Guatemalan company called Celgusa (Cellulosa de Guatemala) is building a 110,000-tpy bleached kraft market pulp mill at El Rancho in Guatemala. The plant may begin operation during 1985. The raw material will be indigenous pine.

SPAIN, PORTUGAL USING EUCALYPTUS. The Iberian peninsula is another growth area for market pulp production, principally bleached hardwood from eucalyptus in both Spain and Portugal.

Portugal's capacity, the larger of the two countries', is about 810,000 tpy and by the end of 1984 should be approximately 1.1 million tpy (with the successful startup of the Soporcel mill this year). This plant will produce both eucalyptus and pine (about half and half) kraft market pulps.

Spain's market pulp capacity is roughly 700,000 tpy, almost entirely eucalyptus kraft pulp. In Spain, about 35% of market pulp output is for export, and 65% is used at home. This means that Portugal's market pulp exports could be about four times that of Spain when the Soporcel mill is up to capacity.

It is obvious that in recent years, bleached eucalyptus kraft pulp has become an important market grade, with an annual capacity of more than 3 million tons for western Europe and South America. It has become a direct competitor with bleached hardwood kraft.

Eucalyptus pulp is said, in general, to have properties similar to southern U.S. hardwood kraft pulps, but as indicated by market prices, it is not of the quality of northern (Canada and Scandinavia) hardwood krafts. The greater uniformity of species in the timber stands of the northern countries makes it easier to pulp the wood for optimum properties.

JAPANESE IMPORTS RISING. Total production of woodpulp in Japan has been declining in recent years and is now down to the level it was 12 years ago. Domes-

tic shipments of market pulp were off 30% during that period.

Between 1970 and 1983, imports of pulp rose more than 125%, or up from 8% to 17% of Japanese pulp consumption. Yet paper and board output showed a very moderate increase. There are several reasons for this doubling of imports:

- The total number of groundwood mills in Japan has decreased from 11 in 1970 to 4 in 1983.
- High manufacturing costs in Japan, for both integrated and market pulp mills, combined with the low value of the dollar vs the yen (pulp prices are customarily quoted in U.S. dollars throughout the western world), have meant that Japanese mills could frequently purchase foreign pulp more cheaply than they could produce it.
- Integration of pulp mills into paper or board manufacture has been a factor in reducing the amount of Japanese-produced market pulp available.

Another factor affecting Japanese market pulp production and imports has been Japan's increase in wastepaper usage. This has grown from 35% of fiber furnish used for paper and board manufacture in 1970 to around 45% in 1982. A similar increase is unlikely for the next 12 years since, in the collection of wastepaper, there is a "law of diminishing returns" effect.

Next to the U.S. and the Fed. Rep. Germany, Japan is the world's largest importer of papermaking pulp, importing approximately 1.8 million tons in 1983. The Japanese mills seem to prefer northern bleached kraft pulp, which makes Canada the leading supplier of pulp to Japan, with the U.S. coming in a strong second.

Some Japanese companies have sought to protect their imported pulp requirements by entering into joint ventures for new dried pulp mills abroad. Japan has three such projects in operation for bleached kraft—two in Canada and one in Brazil. Bleached kraft pulp from the Brazilian mill is produced from eucalyptus. Pulp from this mill, shipped to its Japanese co-owners, probably makes up the bulk of the Japanese pulp imports from Brazil, which in 1983 amounted to about 200,000 tons. This makes Brazil the third largest supplier of pulp to Japan.

There are also three such joint ventures producing mechanical pulp—two in Canada and one in New Zealand. These joint ventures are reported to be responsible for approximately 30% of total papermaking pulp imports by Japan. It would appear that pulp imports into Japan will continue to grow, but at a slower rate than in recent years.

SOVIET SUPPLIES TIGHT. The immense softwood forest resources of Russia reportedly amount to 60% of the world total. Eventually, these may provide some needed pulp for world markets.

For the present, however, it appears that a Soviet five-year plan for pulp and paper expansion is well behind schedule. As a result, after supplying its expanding needs and those of its satellite countries, there is little Soviet pulp available to market, except when pulp is squeezed out of internal needs to export for political or foreign exchange reasons.

Soviet foreign trade statistics indicate that France was the only western nation to purchase Soviet market pulp in 1980 and 1981.

New mills are being concentrated in the heavily forested areas of Asian U.S.S.R. Thus, if and when a major effort is made to enter strongly into the pulp market, it is most likely to be directed at such major Asian importing countries as Japan, Korea, and China.

When the communist countries have ample supplies of market pulp to export, times may be happier, and the western world will be pleased to make paper from Soviet pulp.

MEDIUM-, LONG-TERM OUTLOOK. The 1984 scheduled startup of known new facilities designed to produce in excess of 700,000 tpy of hardwood kraft market pulp, coupled with the startup in 1986 of a new hardwood kraft pulp mill designed for 260,000 tpy (resulting in approximately 1 million additional tons), should provide ample supplies of this pulp for a few years. About 60% of this new capacity will be based in the U.S.

The extremely high cost of constructing new market pulp mills will, in the future, be a deterrent to a large buildup of excess market pulp capacity worldwide. The limited availability of softwood stands for pulping in the western world should mean continued growth in hardwood market pulp.

The possibility of a serious shortage of market pulp in world markets is unlikely, at least during the balance of this century. Canada, which is by far the world's largest exporter of market pulp, has sufficient softwood resources for substantial new market pulp capacity and has hardly begun to tap its very considerable stands of hardwood east of the Rocky Mountains.

The fast growth rate of plantation eucalyptus has proved the economic viability of marketing bleached hardwood kraft from this species. Brazil, Portugal, and Spain have demonstrated this from forestry to marketability. There is potential for major capacity expansion in all three countries.

The extremely high cost of constructing new market pulp mills will, in the future, be a deterrent to a large buildup of excess market pulp capacity worldwide. The limited availability of softwood stands for pulping in the western world should mean continued growth in hardwood market pulp.

Use of bleached chemimechanical market pulp, both from softwoods and hardwoods, is just beginning, but could see strong growth because of the lower capital costs and the fact that pulp yield from wood is nearly double that of bleached k

In the long term, softwood kraft will command a high premium. In the very long term, the truly immense softwood forests of the U.S.S.R. should become a major world source of softwood kraft. ■

ISSUE FOCUS:

World Review

World TiO_2 pigment supply seen tightening through this decade

Economic and environmental constraints have caused plant closures in the U.S. and Europe, discouraging new capacity investments

By FRED MONTANARI

■ The titanium dioxide (TiO_2) pigment business today must be viewed from a global perspective, as international supply and demand considerations are having a significant impact on the market. Demand for the pigment (used to add whiteness, brightness, and opacity to paper) is closely correlated to growth in both population and GNP—while supply continues at a relatively constant level, based primarily on the effective capacity of existing plants. This situation will lead to an increased tightening of an already tight TiO_2 supply. This article presents a detailed analysis of the TiO_2 market, the interactions between geographic areas, environmental restraints, and supply capability.

Before 1970, the TiO_2 industry grew at an annual rate of 5% to 15%. Many factors have led to reduced growth rates in the past decade: changes in consumption patterns, industry maturity, and an overall reduction in growth of industrial activity in developed countries.

A correlation of TiO_2 consumption with GNP shows that per capita consumption has leveled off in the U.S. (Figure 1). Although specific market sectors may exceed GNP growth, the overall growth rates experienced in the past will not return.

A similar situation is expected in western Europe, where the variability in exports of TiO_2-containing products and a somewhat different end-use market distribution will have minor impact on the demand pattern. Growth rates in the rest of the world will be faster because these nations are in the steeper portions of the per capita consumption graph. They are improving their standard of living and demanding more "quality of life"

FIGURE 1: **TiO_2 consumption as a function of GNP in the U.S.**

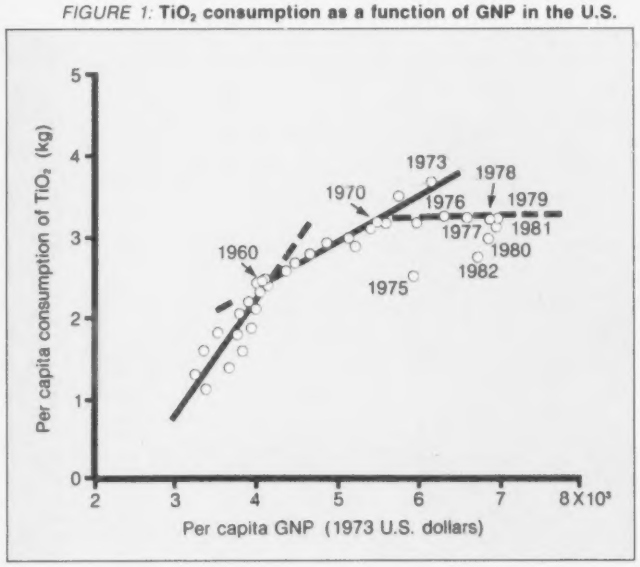


TABLE 1: **End-use market growth.**

End-use market	United States	Western Europe	Rest of world
Coatings	+1.5%/yr.	+1.0%/yr.	+3.5%/yr.
Plastics	+3.5%/yr.	+2.0%/yr.	+6.0%/yr.
Paper	+2.0%/yr.	+1.0%/yr.	+1.2%/yr.
Other	+2.4%/yr.	+1.0%/yr.	+2.5%/yr.
Average	+2.0%/yr.	+1.3%/yr.	+3.5%/yr.
		Worldwide: 2.3%/year	

TABLE 2: **U.S. TiO_2 pigment market recession and recovery.**

Market	Recession 1982 vs 1981	Recovery 1983 vs 1982	CAG (%) 1981-1983
Coatings	−9.2%	12.0%	0.8%
Paper	0.4%	11.8%	5.9%
Plastics	−2.5%	12.8%	4.9%
Other	−1.9%	3.4%	0.7%
Weighted average	−4.9%	11.2%	2.8%
TiO_2	−11.2%	18.9%	2.8%
GNP	−1.9%	3.4%	0.7%

Mr. Montanari is executive vice president, NL Industries Inc., Hightstown, N.J.

products containing titanium dioxide. The major constraint on demand growth in these markets will be the availability of hard currency to purchase products or build capacity.

An examination of TiO_2 business segments by end-use industries and geographic area reveals a world marketplace divided into three major segments: the U.S., western Europe, and the rest of world (Figure 2). Coatings are the predominant end-use industry in each market area. Use of the pigment in the plastics industry is also a strong and growing component of each market. The large consumption of TiO_2 in the U.S. paper industry is due to the heavy use of coated paper in magazines and catalogs, and the use of uncoated paper in copiers and computer print-outs. The "other" category includes the fibers, ceramics, rubber, and cosmetics industries, and in the aggregate represents a large market requiring special-purpose TiO_2 grades.

Trend lines for each geographic area can be developed by combining these data with end-market growth rates (Table 1) A slow (1+%) growth is projected for western Europe, and a 2% growth is predicted for the U.S. Growth in the rest of the world market area (3.5%) will be higher than in both the U.S. and western Europe, as quality of life in developing countries and per capita consumption continues to improve.

ECONOMIC/ENVIRONMENTAL INFLUENCES. Table 2 illustrates how the TiO_2 consumption in the U.S. was affected by short-range economic disruptions. The percent change during the recession of 1982 for all TiO_2-consuming business segments was negative, with the exception of paper, which showed a small improvement. The recovery period of 1983 produced strong growth in all areas.

Due to the usual phenomenon of inventory drawdown-rebuild, the TiO_2 market dropped faster than the GNP during the recession, then rebounded faster than the GNP during recovery. An interesting fact is that overall growth during the entire recession/recovery period corresponds to a normal slow but sustained growth pattern despite a lower than normal inventory rebuild.

The TiO_2 imports and exports graph shows the movement of product in 1983 between the U.S., western Europe, and the rest of the world (Figure 3). Capacity figures cited in this illustration are based on effective capacity—production rates that can be sustained—not nameplate capacity.

The U.S. has been, and will continue to be, a net importer of TiO_2 pigment. Western Europe, which produces 40% more of the pigment than it can consume, must export to the U.S. and the rest of the world. This interdependence of geographic areas is extremely important for the existence of a stable supply situation.

The major environmental concern associated with titanium dioxide manufacture is the disposal of large volumes of acidic-iron wastes. This disposal problem, in a very general sense, is inversely proportional to the titanium content of the process feed material.

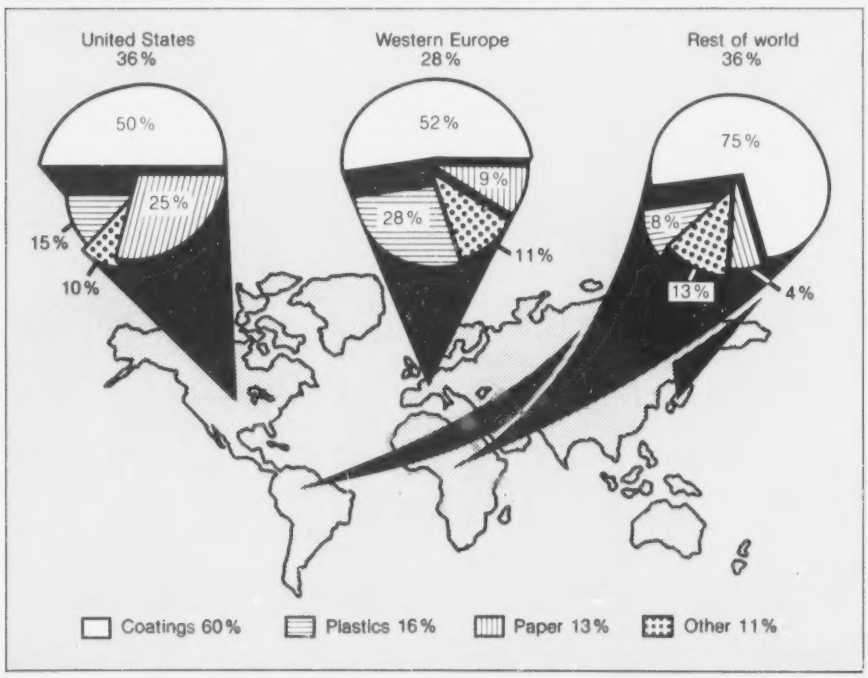
Geographic location has been an important determining factor in the selection of methods used to control effects of waste-disposal operations. Locations of the most recently constructed plants have been dictated, to a large extent, by environmental considerations. However, many plants around the world recycle significant percentages of waste acid and discharge the remainder to waters that have high assimilative capacities. Plants in Europe and the U.S. have been successful in their efforts to sell the useful iron byproducts, thus reducing the disposal problems. Plants in the U.S. dispose of waste effluents in a variety of ways, including discharge into the earth's crust via deep well injection.

The current attempt by the European Economic Community to "harmonize" an effluent control program illustrates the potential effect that environmental issues can have on the supply of titanium dioxide.

Extensive studies have been performed on many of the methods currently used to dispose of liquid wastes from TiO_2 pigment plants in rivers and oceans. These studies indicate that no substantive damage is occurring to the receiving marine ecosystems. Nevertheless, political pressures, as typified by the zero-discharge concept in European Economic Community TiO_2 Directive, resulted in substantial commitments being made for alternative disposal methods.

When unilateral action is taken by any country, that action is extremely disruptive to the market. Fed. Rep. Germany has mandated an end to ocean disposal by 1990. In England, on the other hand, no change in the existing effluent discharge method is felt to be necessary. Other European countries have intermediate stands on this issue. Harmonization of programs by the European Economic Community is necessary to achieve environmental goals without unfairly pe-

FIGURE 2: **End-use markets.**



nalizing individual manufacturers, or, in the extreme case, causing plant shutdowns.

OVERALL SUPPLY/DEMAND TRENDS. Projecting capacity and demand figures into 1988 produces a sobering picture (Figure 4). Supply will be strained to keep up with demand. The high cost of operating older plants has resulted in production curtailments. Plants have been shut down in both the U.S. and Europe, and remaining facilities require capital investment in expensive effluent control equipment. A tightening supply trend has been developing which is already putting pressure on plants to attain full effective capacity.

Major producers are evaluating incremental expansions and working on streamlining operations. A few more years of tight supply may encourage consideration of new plant capacity. But current profit margins and high capital costs discourage large investments in this industry and provide insufficient economic incentive for construction of large scale "grass roots" plants. To bring a new 100,000-ton facility onstream would require an estimated capital investment of $150 million to $200 million and four to five years for completion.

All major suppliers have contingency plans to respond to any unusual increases in demand, but present world capacity is fixed for the 1980s, especially in the U.S. and western Europe. Examples of local disruptions due to mechanical problems and threatened environmental shutdowns have become all too common. Customers must therefore become more cognizant of international supplies for TiO_2, and it appears that, unless there is a recession of significant proportions, TiO_2 will be in a delicate supply/demand balance for the remainder of the 1980s. ■

FIGURE 3: **1983 TiO_2 imports and exports.**

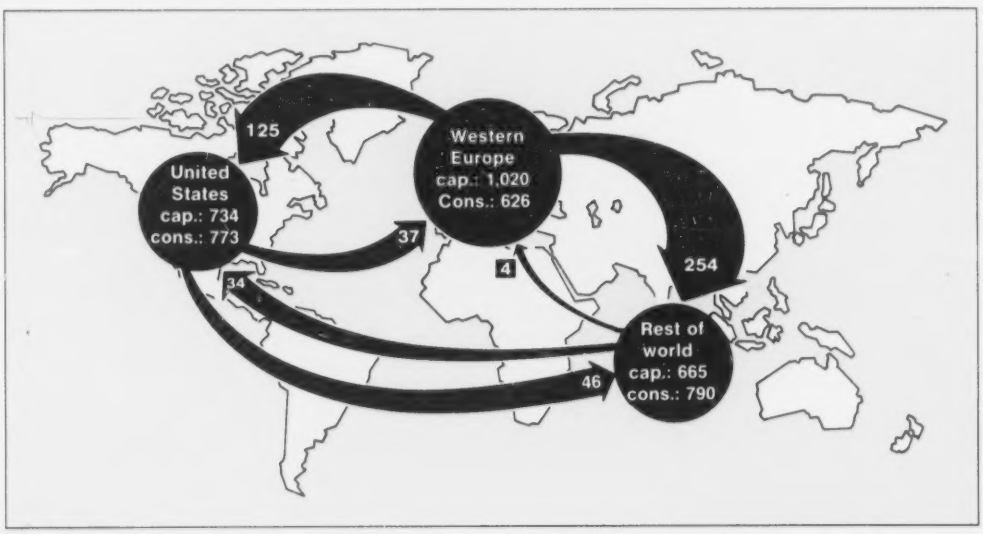
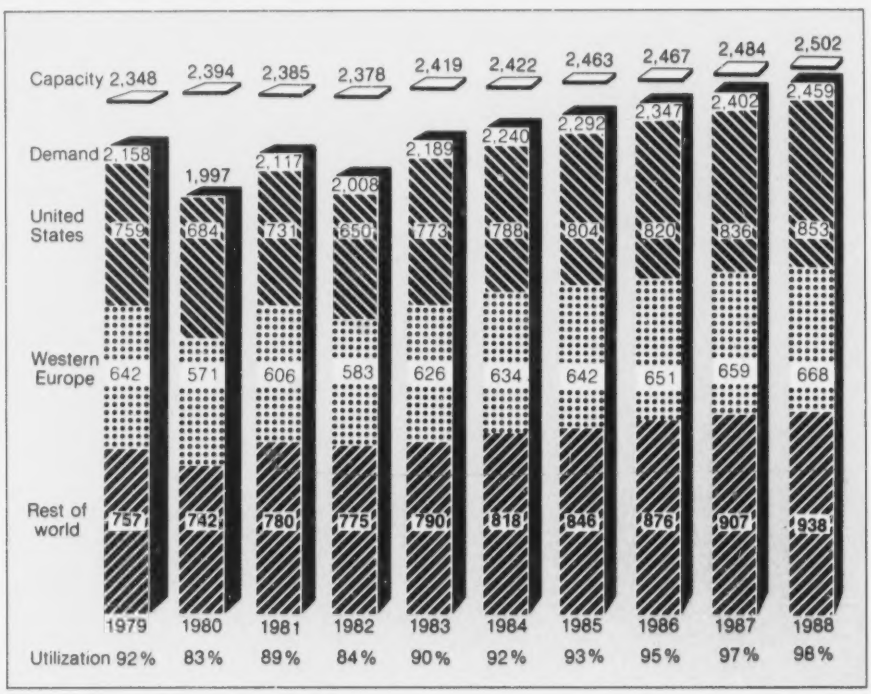


FIGURE 4: **TiO_2 pigment supply/demand projections.**



Sodium sulfate markets recovering slightly in 1984

By BARRY SHOCKETT

Sparked mainly by the detergent industry, total sodium sulfate demand is expected to rise about 5% in 1984. However the long-range forecast for growth in the domestic market is only about 1.5%/yr. Last year's sharp decrease in mill consumption was attributed mainly to the inroads of emulsified sulfur and caustic as a cheaper replacement for saltcake.

The 26% drop in Canadian exports in 1983 was directly related to the decreased U.S. mill demand. As a result, last year's production of natural sulfate was down almost 110,000 tons.

U.S. statistics, sodium sulfate (000 short tons)

	1981r	1982r	1983	1984e
Capacity				
Natural	620[1]	470[2]	460[1]	460
Synthetic (byproduct)	600	600	550	550
Production				
Natural	608	410	400	390
Synthetic	503	454	455	500
Inventory change (year-end)	−33	+36	−18	+8
Imports	291	391.5	343.5	300
Exports	124	111	90.5	85
Apparent consumption	1,245	1,180.5	1,060.5	1,113
Pulp and paper	597.5	566.5	498.5	495
Detergents	485.5	460.5	434	490
Other (glass and miscellaneous)	162	153.5	138	128

1. 400-short-ton plant closed April 1981, reopened January 1983. r=Revised. e=Estimated.
2. 2,000-short-ton plant closed March 1982.
Sources: Bureau of Mines, U.S. Dept. of the Interior; Bureau of Census, U.S. Dept. of Commerce.

Canadian statistics, sodium sulfate (000 short tons)

	1981r	1982r	1983	1984e
Capacity[1]	940	944.5	896[2]	872
Production	699	680	589	613
Inventory change	−42	−8	+8	+22
Imports	14	19	25	24
Exports	313.5	364	269	275.5
Apparent consumption	357.5	327	353	383.5
Pulping	281.5	252.5	279	308.5
Detergents	50.5	51.5	49	49.5
Other[3]	23.5	23	25	25.5

1. Includes 1,070-short-ton byproduct capacity. r=Revised. e=Estimated.
2. 500-short-ton plant closed May 1983.
3. Including glass, textiles, animal feeds, miscellaneous.

SODIUM SULFATE

UNITED STATES

Uses: Sodium sulfate (saltcake) is the main source of makeup sodium and sulfur for kraft pulp mills. It is also utilized by the glass industry and for detergents.

Demand: In 1983, pulp mill demand for sodium sulfate dropped to 498,500 tons, down 12% from 1982. Detergent applications accounted for an estimated 434,000 tons. Mill usage is expected to decrease slightly in 1984.

Sources: Three firms mine natural sodium sulfate—Great Salt Lake Minerals & Chemicals, Ozark-Mahoning (Div. of Pennwalt), and Kerr-McGee Chemical. Great Salt Lake has had some problems lately, resulting in extensive downtime. Three byproduct producers have closed their plants. The major byproduct producers now include Akzona, Allied Chemical, Avtex, Climax Chemical, Diamond Shamrock, and Lithium.

Availability: Ozark Mahoning's expansion program and the expected growth in byproduct sulfate output should ensure an adequate supply for the mid-term. 1984, market; 1983, tight to market; 1982, market to tight; 1981, market; 1980, tight to market.

Pricing: The lists established on Jan. 1, 1983—$91/ton in the South and $99/ton on the West Coast—have not changed. Canadian saltcake for export to the U.S. is also still listed at its Jan. 1, 1983 price of C$82/ton, f.o.b. mine. Price history: 1983, $99/ton, f.o.b. works, freight equalized; 1982, $79-$94/ton; 1981, $68-$79/ton; 1980, $60-$69/ton.

Forecast: Production of byproduct sulfate should increase about 10% in 1984, while natural output continues to decline.

CANADA

Uses: Kraft pulp mills consume most of the saltcake in Canada. The next largest end use being the detergent industry.

Demand: Canadian pulp mills consumed about 279,000 tons of saltcake in 1983, compared with the 252,500 tons purchased in 1982. In 1984, mills are forecasting an increase in demand of almost 30,000 tons.

Sources: Five natural sulfate producers (listed in descending order of nameplate) are Saskatchewan Minerals, Hudson Bay Mining & Smelting's Francana Minerals Div., and Midwest Chemicals, while Alberta Sulphate and Ormiston Mining have similar capacities. The two byproduct producers, accounting for 12% of total capacity, are Courtaulds and Ontario Paper.

Availability: With 25% to 30% of surplus capacity available for the next few years, no shortages are expected. 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: The price of domestic saltcake has remained steady at $81/ton since Apr. 1, 1983, and will probably continue at that level for the balance of 1984. Price history: 1983, $75-$81/ton, bulk, f.o.b. production point; 1982, $70-$75/ton; 1981, $55-$70/ton; 1980, $50-$55/ton; 1979, $50/ton.

Forecast: The pulp and paper industry's share of total sodium sulfate demand has averaged 78% over the past three years and is expected to reach the 80% level in 1984. In the long term, however, mill usage should decline about 2%/yr.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.